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ASIATICK RESEARCHES;

OR,

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED IN BENGAL,

FOR ENQUIRING INTO THE

HISTORY AND ANTIQUITIES, THE ARTS, SCIENCES, AND LITERATURE,

51028

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VOLUME THE THIRTEENTH.

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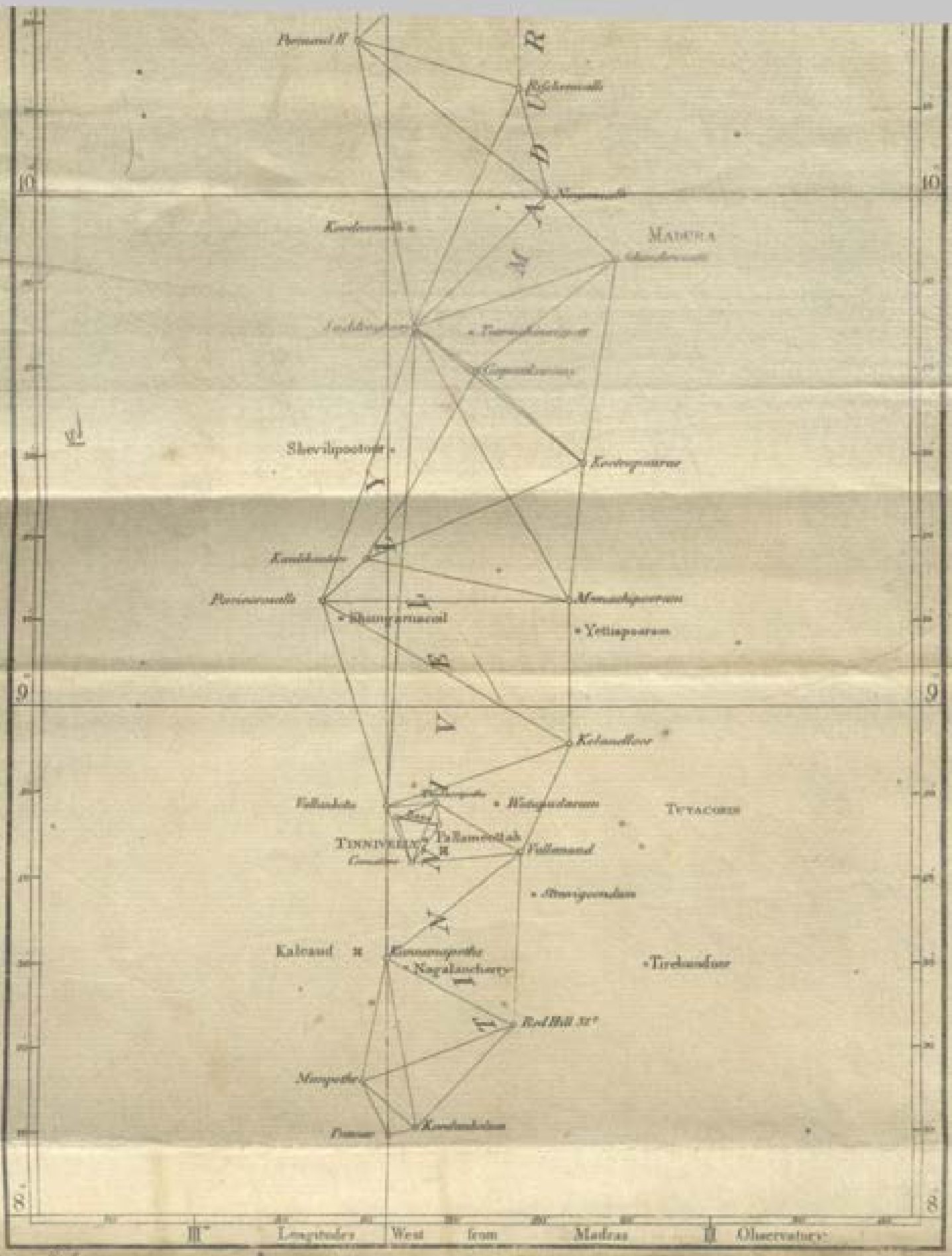


MADURA
Shevilipootoor
Yettiapooram
Kolandloor
Tuyacorin
Tinnivelly
Vullanand
Kaleaud
Nagalancherry
Red Hill St.
Manpothe
Longitudes West from Madras Observatory

of the

PRINCIPAL TRIANGLES

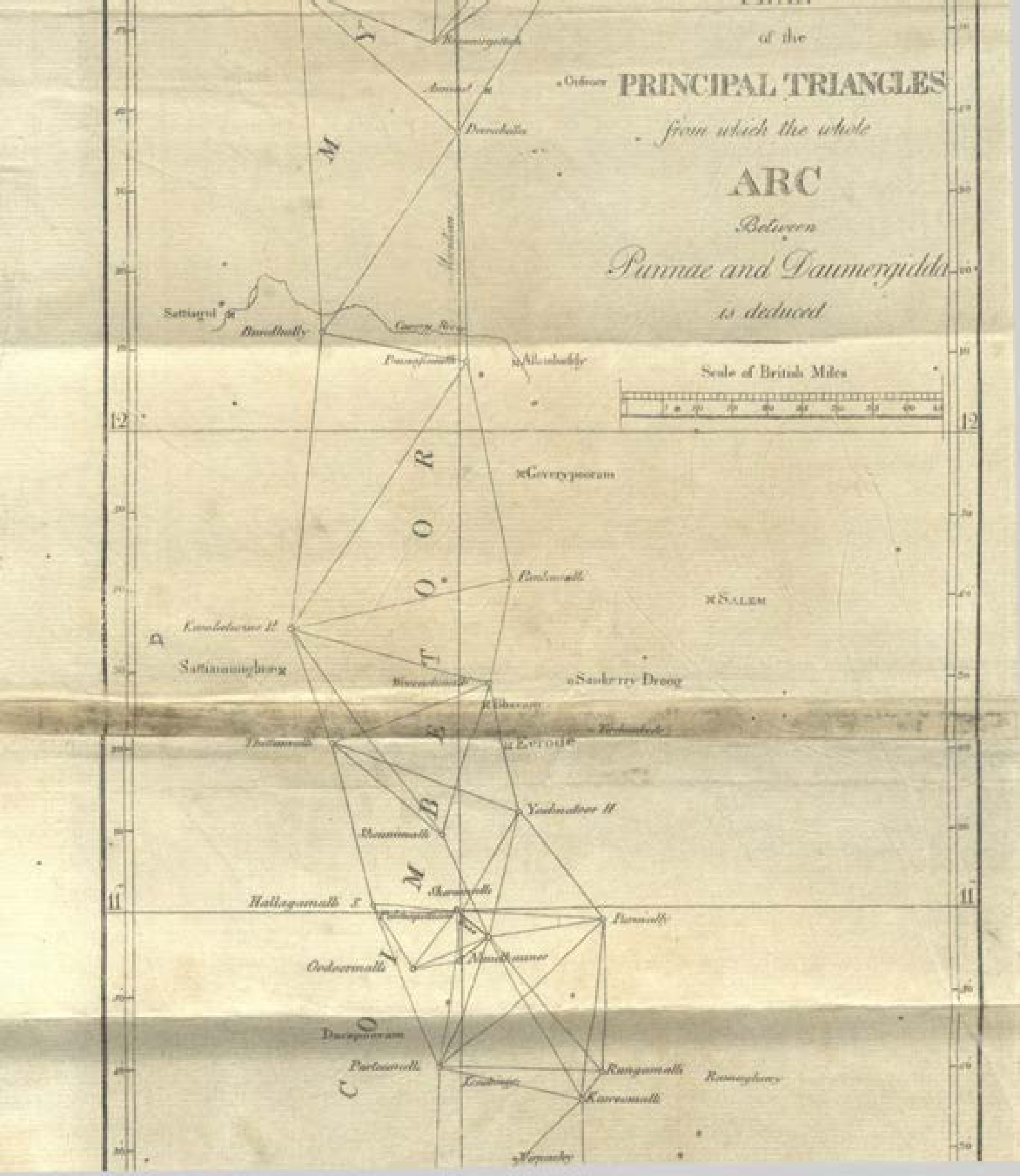
from which the whole

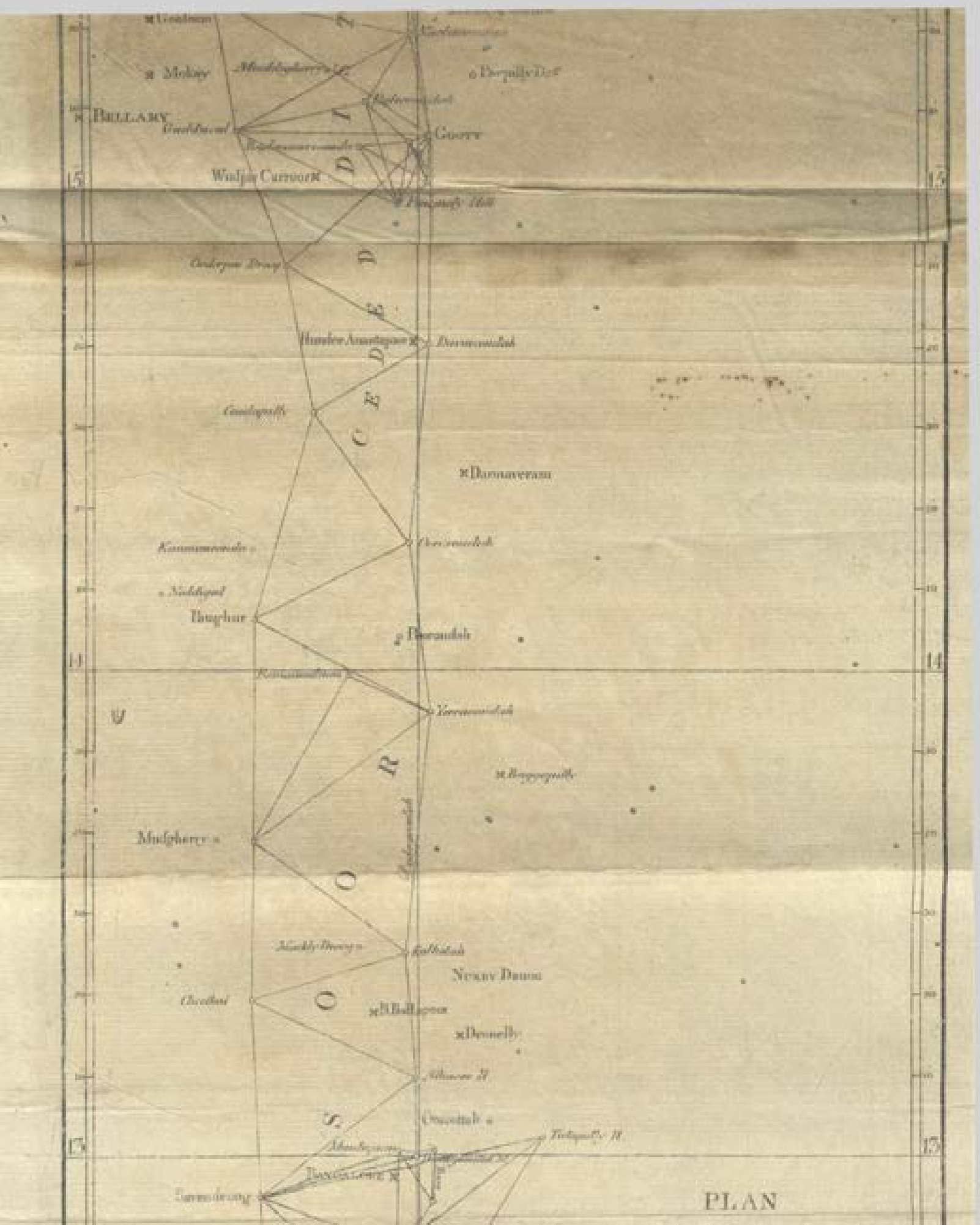
ARC

Between

Punnae and Daumergidda

is deduced




BELLAMY
Goory
Wudjar Curroor
Darmaveram
Bingbur
Mudgherry
Nuxby Drooe
Dronelly
Sevendroog
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14
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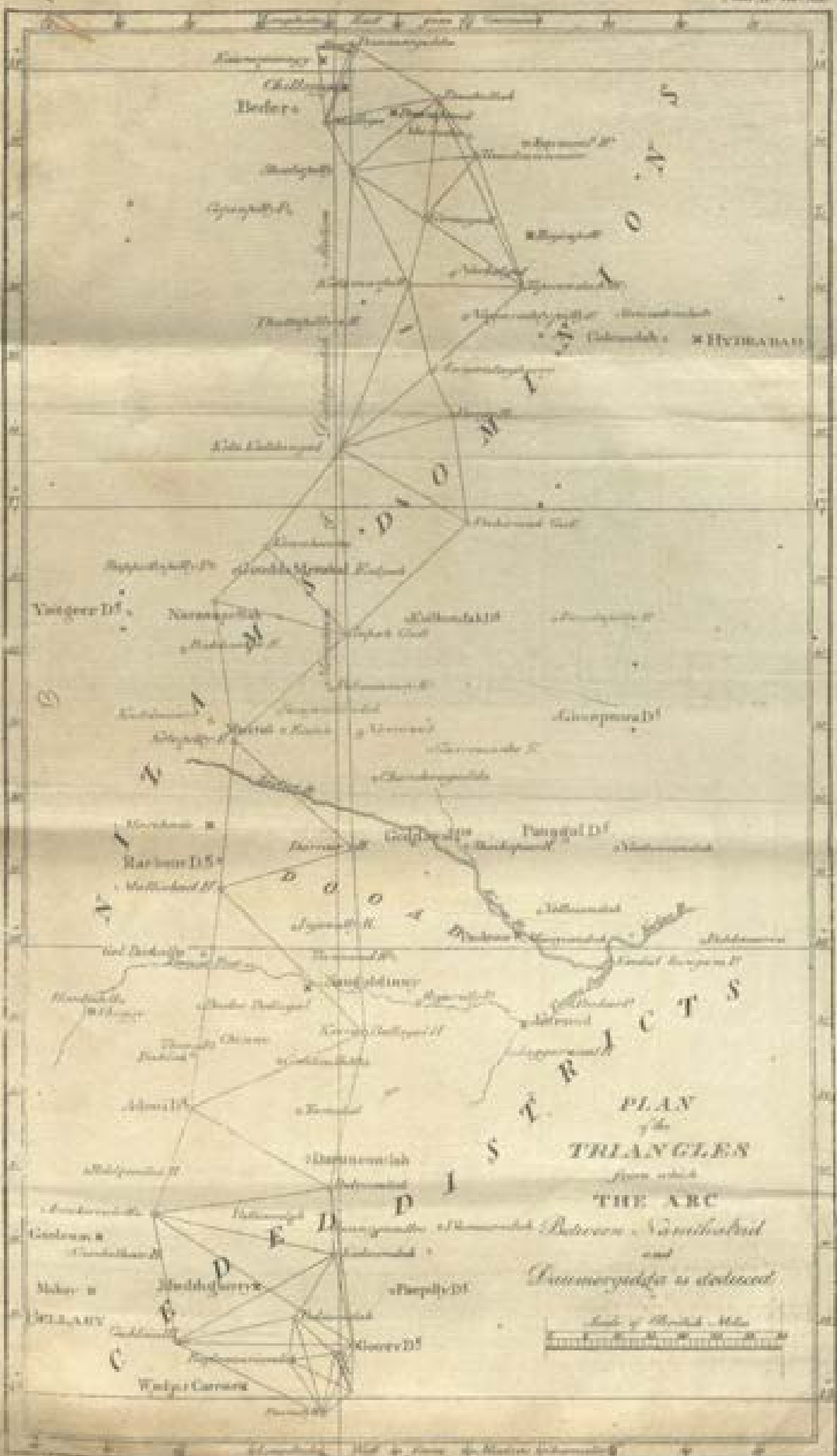
PLAN


PLAN
of the
TRIANGLES
from which
THE ARC
Between Nanthaleid
and
Daumergidda is deduced
Scale of British Miles
Beder
Hydrabad
Yangeer Ds
Narsampollah
Kulkondah Ds
Ghunpoora Ds
Paungul Ds
Rarbour Ds
Nanfoldinny
Adoni Ds
Darunconilah
Gudewan
Mahur
Mudhigherry
Paepilly Ds
Gooty Ds
Wadpur Carrow
NIZAMS DOMINIONS
DOOAB
CEDED DISTRICTS

I.

Account of the meaſurement of an Arc on the Meridian, extending from Latitude 15° 6′ 0″,2 to Latitude 18° 3′ 45″, being a further continuation of the former Arc, commencing in Latitude 8° 9′ 38″.

BY LIEUT. COLONEL WILLIAM LAMBTON,
33rd REGIMENT OF FOOT.

MY laſt communication to the *Aſiatick* Society gave an account of the meridional operations comprehended between the ſtation of obſervation in *Coimbetoor*, and that near *Gooty*, giving an arc whoſe amplitude was 4° 6′ 11″.28 which being added to the former arc extending from the ſame ſtation (*Putchapolliam*) in *Coimbetoor*, to the ſtation of obſervation at *Punnae* near *Cape Comorin*, gave altogether an arc of 6° 59′ 21″.82. The arc which is the ſubject of this paper, commences at the ſtation of obſervation at *Namthabad*, near *Gooty*, and

terminates at another ſtation of obſervation near *Daumergidda* in the Nizam's dominions, as high as the latitude 18° 3′ 23″.53, being an increaſe of 2° 57′ 23″.32, and making in the whole an arc of 9° 53 45″.14 in amplitude, the longeſt that has ever been meaſured on the ſurface of this globe. The great extent of theſe operations, together with the conſiſtency of the reſults, will, independant of any foreign meaſurements, be competent to eſtabliſh the elliptic hypotheſis with reſpect to the figure of the earth. And that this may be done in the moſt ſatisfactory manner, I have contrived to make the length of this ſection ſuch, that its middle point may be as near the latitude of 16° 34′ 44″ as poſſible, becauſe the middle point of the firſt ſection falls in 9° 34′ 44″; ſo that in calculating the ſucceſſive degrees according to the elliptic theory, the computed and meaſured degrees may be compared.

In my liſt, it appeared that the mean length of the degree due to the latitude of 11° 37′ 49″, the middle point between *Punnae* and *Namthabad*, was 60480.3 fathoms. Since that paper was ſent, there has been a ſmall correction applied to the baſe near *Gooty* after comparing the chains with the braſs ſtandard ſcale, as will appear in the detailed account of that delicate operation. This correction has ſomewhat increaſed the meridional diſtance between that baſe and *Perracondah* ſouth, and conſequently the whole terreſtrial arc between *Namthabad* and *Punnae* is alſo increaſed; which now gives the degree due to latitude 11° 37′ 49″ equal 60481 55 fathoms. However as there are now three ſections, whoſe reſpective middle points lie in 9° 34′ 44″; 13° 2′ 55″ and 16° 34′ 42″; I have thought it beſt to take the degrees due to theſe latitudes, as deduced from actual obſervations, uſing each, *firſt*, with the *French* meaſure, *then*, with the *Engliſh* meaſure, and *laſtly*, with the *Swediſh* meaſure; and thence obtaining a *general mean* ratio of the polar axis to the equatorial diameter.—The *firſt* mean of theſe three

degrees uſed with the *French* degree, gives that ratio as 1: 1.0034295. The *ſecond* mean of the ſame three degrees uſed with the *Engliſh* degree gives it as 1: 1.0031913; and the *third* mean of the ſame three degrees uſed with the *Swediſh* degree gives it as 1: 1.00324179, and the mean of theſe three means gives the ratio of the polar to the equatorial diameter as 1: 1.0032895, or the compreſſion at the poles $\frac{1}{304}$ or $\frac{3}{914}$ very nearly: and this ratio has been finally adopted for computing the general ſcale of degrees both of latitude and longitude, and alſo of the degrees perpendicular to the meridian, from the equator to the pole.

It is well known to mathematicians, that if a meridian of the earth be an ellipſe, whatever may be the compreſſion at the poles, the increments to the firſt degree of an arc on that meridian to make it equal to any other degree north from it, will always be *as* the increment to the ſquare of the latitude of that diſtant degree, above the ſquare of the latitude of the firſt degree.—That theſe *Indian* operations may reſt entirely on themſelves, I have adopted this method for computing a ſucceſſion of *nine* degrees, beginning with the degree in latitude 9° 34′ 44″, which is 60472,83 fathoms. The *eighth* of theſe degrees falls in latitude 16° 34′ 44″, and is 60509.12 fathoms.—Now the degree due to latitude 16° 34′ 42″ as determined by the meaſurement is 60512,78 fathoms, ſo that there is only a difference of 366 fathoms, a quantity too inconſiderable to affect the elliptic hypotheſis.—This is ſuppoſing the degree in latitude 9° 34′ 44″ to be right, in which caſe the compreſſion at the poles would be $\frac{1}{279}$ nearly. But if the compreſſion $\frac{1}{304}$, as deduced from the *general* mean be ſuppoſed correct, and the degree in 9° 34′ 44″ increaſed to 60475,13 fathoms (ſee Art. 16,) the next degree in 10° 34′ 44″, will be 60478,72, and theſe uſed will give the compreſſion $\frac{1}{305}$ nearly; ſo that by this method, the *errors* in the

degree due to latitude 9° 34′ 44″ and in *that* due to latitude 16° 34′ 42″, (which will according to this alteration come out 60507,19 fathoms) may be determined. And it appears that the firſt is 23 fathoms in defect, and the other 5 59 fathoms nearly, in exceſs; both very ſmall quantities, the greateſt being leſs than $\frac{1}{7}$ of a ſecond on the earth's ſurface.

With reſpect to the compreſſion, it is impoſſible that $\frac{1}{178}$ can be very far from the truth, ſince the whole of the meaſurements which are entitled to the greateſt confidence, are taken into account. The *French* mathematicians, by uſing Bouguer's meaſurement at the Equator with their own, have found the compreſſion to be $\frac{1}{178}$ nearly. But if theſe *Indian* meaſurements be correct, Bouguer's degree at the equator is 23 fathoms in exceſs. I have the higheſt opinion of that ſagacious obſerver, who appears to have been the moſt correct of all the academicians ſent out at that time, and the only one apprized of the effect of local attraction on the plummet. But to obſerve in ſo mountainous a country, and with an inſtrument far inferior to theſe now in uſe, an error of that magnitude is not to be conſidered as ſurpriſing; yet it will make a conſiderable difference in the compreſſion. The celebrated La Lande in all his aſtronomical obſervations, where the figure of the earth was concerned, invariably uſed $\frac{1}{178}$; and if this be taken in computing the preceſſion of the equinoxes, and the effect of ſolar nutation, the theory will very nearly agree with obſervation. The compreſſion is an element of very general importance in the higher branches of phyſical aſtronomy; and it is gratifying to think that the quantity deduced from theſe recent combined meaſurements is nearly that which has been adopted by the ableſt aſtronomers, to make the theory agree with obſervation.

In order to do every poſſible juſtice to this important ſubject, in place of the meaſurement of degrees due to any particular latitudes, I have uſed the two longeſt arcs, viz. the one which I have here given an account of, and that meaſured by De Lambre and Méchain between *Dunkirk* and *Barcelona*. The firſt being 598310 fathoms, correſponding with a celeſtial arc of 9° 53′ 45″.13; the other 537987 fathoms, corresponding with an arc of 9° 40′ 12″.2; with theſe I have inveſtigated the compreſſion by a method ſimilar to that given by Profeſſor Playfair in the 5th Vol. *Edinburgh* Philos. Tranſactions. This method with very long arcs, ſuch as theſe, one would imagine muſt afford ſurer reſults than by taking ſingle degrees due to particular latitudes, where there is much irregularity in their ſucceſſion, as is the caſe with the *French* meaſurements. The compreſſion brought out by this method (ſee Art. 18) is $\frac{1}{304}$ nearly, which differs very conſiderably from what is brought out by the aforeſaid general mean; and what is ſingular, it is nearly the ſame as that given by taking the degree in 9° 34′ 44″ equal 60472,83 fathoms, and the one in 10° 34′ 55″ equal 60476,89 fathoms, and where the degree in latitude 16° 34′ 42″ by obſervation, only differs 3,66 fathoms from the computed one. I have however, for reaſons already given, abided by the compreſſion $\frac{1}{305}$ as brought out by the general compariſon.

This meridional ſeries, which commences at the baſe near *Gooty*, is terminated by another baſe in latitude 18° 2′ nearly, which has been meaſured with more than ordinary attention; and beſides the ſtars obſerved at *Daumergidda* for comparing with thoſe obſerved at the ſouthern ſtations, ſeveral others have been ſelected for extending the celeſtial arc ſeveral degrees further to the northward, ſhould time and circumſtances prove favorable for that purpoſe. However, ſhould this

never happen. I am of opinion, that ſufficient has been done for eſtabliſhing the points in queſtion, viz. the elliptical figure, and dimenſions of the earth, the great objects of all the meridional operations, eſpecially thoſe recently performed, which in grandeur and accuracy must be allowed to exceed any thing of the kind recorded in the hiſtory of practical ſcience. The great excellence of the inſtruments now in uſe is the chief cauſe of this ſuperior accuracy; and it is by that ſame excellence that irregularities have been diſcovered which former obſervers were not aware of, and therefore not prepared to guard againſt; and the univerſal principle of attraction, which has long been eſtabliſhed, is now found to affect the plummet of a zenith-ſector, and where there is any unequal force acting in the direction of the meridian, occaſioned either by mountains or by different denſities of the ſtrata lying to the north and south of the ſtation of obſervation, the plummet of the ſector will be drawn from its vertical poſition. The *French* and *Engliſh* operations have been conſiderably diſturbed by this inviſible agent; for ſo it may be termed, when no mountains are near; and my former obſervations at *Dodagoontah*, *Bomaſundrum*, and *Paughur* have witneſſed its effects. Having however, left out thoſe ſtations altogether, the obſervations at *Punnal*, *Putchapolliam*, *Namthabad*, and *Daumergidda*, appear to have been entirely free from any anomaly, a circumſtance which muſt give a preference to theſe extenſive operations over any of the preſent day.

After having determined the ratio of the polar axis to the equatorial diameter, their actual lengths are thence obtained, and finally the length of the quadrantal arc of the meridian, from which the *French* mathematicians have deduced their ſtandard; the 10,000,000th part of which are reduced to inches, being their *metre* or *unit* of meaſure. The meaſure of the *metre* here brought is 39,37,08 *Engliſh* inches at the

temperature of 62°, which is within $\frac{1}{100}$th part of an inch of what the *French* measure will be, when reduced to the same temperature; a quantity altogether insensible.

Having brought these meridional operations to so successful a conclusion, it may not be altogether out of place to give some account of the still more extensive geographical ones, of which these have been a principal foundation.—The whole of the peninsula is now completed from *Goa* on the west, to *Masulipatam* on the east, with all the interior country from *Cape Comorin* to the southern boundaries of the *Nizam's* and *Marhattas* territories. In that great extent of country, every object that could be of use in geography, or in facilitating the detailed surveys of the provinces, has been laid down with precision—All the great rivers sketched in, in a general manner, and all the great ranges of mountains slightly depicted. The latter part of the survey which takes in the northern part of the peninsula between the latitude of 14°, and southern frontiers of the foreign dominions, has been attended with peculiar success, and the districts of *Nellore*, *Guntoor*, *Palnaud*, the ceded districts, the *Mysoor* to the north of 14°, the *Soondah* country, and the district of *Goa*, are covered with a net of triangles without a single break. The districts of *Soondah* and *Goa* have been surveyed by Lieutenant Garling, of the *Madras* establishment, who has in his possession a fine instrument made by Cary; and such was my opinion of his accuracy and judgment, that I requested to be furnished with his triangles to include in my general report; and the near coincidence of the sides common to both surveys, has proved that my confidence was not misplaced.

My excursion into the *Nizam's* country was for the sole purpose of getting three degrees more to the arc, and it was with some hesi-

tation that I entered it at all, from being apprehenſive of interruption occaſioned by the jealouſy of the inhabitants; but all impediments have been removed by the truly liberal ſupport which I have met with from Mr. HENRY RUSSELL, the Reſident at the *Nizam's* court, who to a zeal for promoting uſeful ſcience, has added a ſpirit of national pride in forwarding the object of my labours.—By his good offices every appearance of difficulty has vaniſhed; and it is but juſt to ſay thus much as a tribute due to his kind and friendly attention.—I at firſt indeed experienced ſome delays when my ſignal flags were ſent forward, and that from not knowing in what diſtrict they might fall; but when that happened, an order from the jaghiredar was inſtantly procured by the miniſter, and the difficulty removed.—But when it became generally known that I was not ſurveying their little diſtricts, the alarm ceaſed, and I met with the ſame willingneſs to aſſiſt, as I found in every other part of the peninſula, eſpecially among the *Gentoo* inhabitants. The moſt ſerious impediments that I ſhall apprehend to the northward will be from the gangs of plunderers, which infeſt that quarter when the Army is not in the field.—It will however be a deſirable object towards promoting general geography, as well as for giving a baſis for local ſurveys, to extend this work as far to the northward as poſſible, and to enlarge it, as is intended, ſo as to take in all the great military roads leading from the ceded diſtricts to *Jaulna*, *Ellichpoor*, *Nagpoor*, &c; and when that ſhall be completed, and the triangles extended from *Maſulipatam* to *Point Palmiras*, all which is a part of the work before me, I truſt that I ſhall have contributed my ſhare towards the advancement of *Indian* geography. Should I live to accompliſh all *that*, there will then be, beſides the great extent of territory already comprehended, a foundation laid for extending this ſurvey over the whole of the *Deckan*, through *Oriſſa* and the more northern provinces, through the *Marhatta* dominions; and finally, into the upper diſtricts of *Hindáſtan*, and I ſin-

cerely hope, that after I relinquish it, some one will be found possessing zeal, constitution, and attainments wherewith to prosecute it on the principles already followed —It would indeed be gratifying to me if I could but entertain a distant hope, that a work which I began, and which will then be brought to so considerable a magnitude, should at some future day be extended over *British India*.

W. LAMBTON.

HYDRABAD, *September* 15, 1815.

I.—*COMPARISON OF THE CHAINS, WITH THE BRASS STANDARD.*

PREVIOUS to giving any detailed account of this section of the arc, it will be proper to observe, that it became necessary to make some correction in the length of the base near *Gooty*, on account of an irregularity that was discovered in the standard chain, or rather in the comparative lengths of the two chains. It may be remembered that one of the chains in my possession has always been applied as a standard chain, and having been sent out new in 1802, I have kept it carefully laid by, thinking that while it was clean and never used as a measuring chain, its length would remain invariable; and the comparative lengths of the two chains seemed to be perfectly regular, allowing for the wear of the measuring chain, till previous to measuring the base near *Gooty*.—At the conclusion of the base near *Palamcottah*, the excess of the measuring chain above the standard one

was 39.04 divisions of the micrometer head, an excess which I thought rather great, but as there had been a small base measured on the surface of the ground near *Tanjore*, and the recent experiments made with great care, I rested satisfied; though the increase for the measurement was much greater than usual, being 9.38 divisions. I was however much surprised on comparing them previous to the measurement near *Gooty*, to find that the excess was only 30.4 divisions, but being 36.3 divisions at the conclusion, I apprehended that there might have been some oversight at *Palamcottah*, or that the standard chain had increased in its length; in order to determine which, it became absolutely necessary to compare it with the *brass standard*, which was done in the following manner.

As I had not the means of procuring a cast iron bar, and executing the measurement after the manner adopted by the late Mr. RAMSDEN, it occurred to me that if upon a fine surface the chain could be extended its whole length, one hundred feet might be measured off from the standard scale at a given temperature, and by accounting for the difference between the expansion of brass and steel, it would be easy to determine whether the standard chain had suffered any alteration in its length.—For this purpose, I built a brick wall upwards of two feet in height, and something more than 100 feet in length, so that a weight post at one end, and a drawing post at the other, might be fixed in the brick work, and the necessary apparatus applied for drawing out the chain.—The upper surface of this wall was made perfectly horizontal by a spirit level fixed on a straight ruler about four feet in length, and when covered with fine chunam mortar, (a celebrated cement in this country) it was polished, so as to resemble a sheet of glass, an operation at which the workmen here are remarkably expert. After this was com-

pleted, I placed the transit inſtrument which is uſed in laying out the baſe lines, at a convenient diſtance from one end of the wall, ſuch that the point of a fine pencil at the neareſt end might be diſtinctly ſeen through the teleſcope; and by directing it to the other end, a few trials enabled me to ſee along the middle of the wall from one end to the other.—After the inſtrument had been well adjuſted, a ſeries of points was then made, about four feet from each other by looking through the teleſcope, and directing a perſon with a fine pointed pencil in his hand, to move it until it was brought into the interſection of the wires in the focus of the eye-glaſs; and in this manner the points were fixed from one extremity of the wall to the other, and a pencil line drawn through them. This being done, braſs ſcrews with poliſhed heads about $\frac{1}{10}$ of an inch in diameter, were each ſcrewed faſt into a ſquare piece of lead, leaving the braſs button about half an inch about it.—The lead was then ſunk into the chunam till the braſs coincided with the poliſhed ſurface of the wall, and adjuſted by the longitudinal pencil line, and others drawn at right angles to it at certain diſtances roughly meaſured by the beam compaſſes. Of theſe there were fourteen; viz. five at 2½ feet diſtance, beginning with the neareſt end, for the purpoſe of laying off *ten* feet from the braſs ſcale; and then one at every ten feet from the laſt one, to the completion of the hundred.—All theſe being fixed *nearly* correct, a fine line was drawn through the whole in the direction of the pencil line already mentioned; on the firſt of theſe buttons, a croſs perpendicular line was drawn ſo as to make an interſection with the longitudinal one, and nearly in the center of the braſs: this marked the commencement. Every thing being thus prepared and the whole extent of wall ſhaded by tents, the final meaſurement was commenced at about the time of ſun-riſe, on the 24th *March*, 1813, having it ſtrictly in view to perform the whole opera-

tion, during the ſame temperature, which ſeldom varies early in the morning for an hour and a half, and this morning happened to be particularly favorable.

Two feet and a half were then taken off from the braſs ſtandard with the moſt ſcrupulous exactneſs, after examining with magnifying glaſſes the points of the compaſſes, one perſon keeping one of the points carefully fixed to a line on the ſcale, while the other adjuſted the oppoſite point by the ſcrew at the end of the beam.—After being ſatisfied as to the accuracy of this diſtance of 2½ feet, one point of the beam compaſſes was fixed on the point of interſection which marked the commencement, while the other point was drawn acroſs the line on the next braſs button, making a point of interſection. The beam compaſſes were then removed to the next button, and ſo on till ten feet were meaſured off. A long beam was then uſed, and the points with apparatus fixed on it, and adjuſted to that ten feet; and in a manner ſimilar to what has already been deſcribed, the remaining ninety feet were meaſured off and a fine perpendicular line drawn through the laſt point of interſection. As there was full time to repeat the operation, the meaſurement was carried back from point to point, when an exact coincidence was obſerved.

The chain, which, with five thermometers, had been lying cloſe to the wall all night, was then extended at full length; the weight applied, and the arrow at the oppoſite end brought to coincide with the commencement of the meaſured line while the whole chain was adjuſted by the pencil line drawn along the ſurface of the wall; and after allowing ſome minutes for the weight to act freely, the length of the chain was then examined, and found to exceed the braſs meaſure by 0,0341 inches.

The standard chain was then taken aside, and the measuring chain which had been laid along with the other, was compared with the measurement, and exceeded it by 0,2297 inches. This chain was put aside and the standard chain a second time applied, and the arrow coincided with the same mark. The measuring chain was also compared a second time but there appeared no sensible difference. From the comparison of the two chains, it appears that ,2297—,0341=,1956 inches, or ,0163 feet, is the excess of the measuring chain above the other. The whole of these operations were begun and completed while the mean temperature given by the five thermometers, was 72°.

Now the expansion of 100 feet of brass due to one degree of temperature exceeds the expansion of the new chain (according to former experiments) due to one degree temperature, by ,00495 inches, and the same chain measured exactly 100 feet by the brass standard in *London* at the temperature of 50°. therefore (72°—50°)×.00495 gives ,1089 inches which the chain ought to have fallen short, had there been no alteration in its length. But it exceeded the brass measure by ,0341 inches, therefore ,1089+,0341 or ,143 inches=.0119 feet, is what the chain has lengthened, and this quantity would be sensibly the same, were the chain compared with the brass standard at the temperature of 50°, for ,0119 feet of steel for 22° of change in temperature would only be contracted ,0000016 feet, a quantity altogether insensible. Hence the standard chain from this measurement may be considered equal 100,0119 feet at the temperature of 50°.

In the latter end of October 1814, about 19 months afterwards, another comparison was made with the brass standard at *Hydrabad* and inorder to ensure still greater accuracy, instead of using magnifying glas-

ſes for applying the points of the beam compaſſes, the two microſcopes belonging to the circular inſtrument were each placed upon an iron tripod with ſhort adjuſting ſcrews for feet, ſo as to raiſe or lower the microſcope for obtaining diſtinct viſion. The braſs ſtandard ſcale in its mahogany bed was then placed on the table reſting on two pieces of very thin board, each having two flat pieces of wood ſcrewed on it at ſuch a diſtance as to receive eaſily the mahogany bed; and theſe four pieces were of ſuch a thickneſs, that their ſurfaces coincided with the ſurface of the braſs ſcale. They were then moved to a convenient diſtance for meaſuring off 2½ feet, and the microſcopes placed upon them and brought over the required diviſions on the ſcale, and adjuſted by the feet of the tripods to diſtinct viſion. The beam compaſſes were then laid on the ſcale, and the points brought by the hand to be nearly 2½ feet aſunder, and afterwards fixed with care and accuracy by the adjuſting ſcrew at one end of the beam. This being done, the proceſs was preciſely the ſame as in the experiments at *Bellary* having the wall, braſs buttons, &c. in all reſpects the ſame when one hundred feet was meaſured off. The chains were compared as in the former experiments, but to read off the difference between the chain and the braſs meaſure, one of the microſcopes (B) with its micrometer was made uſe of, and the ſcale with its bed was placed in the ſame manner as when the 2½ feet were meaſured off. The microſcope was then placed on the wood and the ſcale moved until the ſmall diviſions at its commencement were brought under the microſcope, the adjuſting feet of the tripod being moved if neceſſary, and diſtinct viſion obtained. Theſe diviſions are each $\frac{1}{20}$th of an inch; that is, half an inch is divided into ten parts. The microſcope was then brought over the firſt of theſe parts, and the wires of the micrometer being placed at right angles to the longitudinal line on the ſcale, they were ſeparated and made to embrace one of theſe diviſions,

The micrometer head was then turned ſo as to bring the wires to a coincidence, and the revolutions of the head and the parts of a revolution were noted down. This was done to each of the ten diviſions, and a mean taken, which gave 18 revolutions and 50 parts for the meaſure of $\frac{1}{10}$th of an inch.

The microſcope was then taken to the oppoſite ſide of the ſcale where every inch is divided into *ten* parts, and each of theſe being meaſured after the above manner, the whole gave a mean of 18 revolutions, 50 parts to $\frac{1}{10}$th of an inch. Now each of theſe

	INCHES.
revolutions is 120 parts, ſo that by allowing 18 r. 50 p. to	0,10000
We have 1 revolution or 120 parts	0,00543
1 part or $\frac{1}{120}$th of a revolution	0,000045

This account of the proceſs and arrangement being premiſed the reſults of the experiments made on the 21ſt, 22d and 23d October were as follows:

Oct. 21ſt,—*One hundred feet* of braſs meaſure was laid off from the ſcale in the temperature of 65, 1° and the ſtandard chain was applied at *the ſame temperature*, when the *exceſs* of the chain

	INCHES
above 100 feet of braſs was 21,3583 r. equal	,11598
And ſince 100 feet of braſs expands more than 100 feet of ſteel by ,00495 to 1° of temperature, and the chain coinciding with the braſs meaſure at the temperature of 50°, we have 15°.1×,00495 inches, or	0,07474
Which the chain ought to have fallen ſhort, had there been no wear, but as the chain exceeded it by	0,11598
Their ſum is, what it has lengthened	0.19072

	FEET
So that the length of the chain is now	100,01589
Oct. 22d.—The brass measure was made at the temperature of 65°, but the chain was compared at the temperature of 67°, and exceeded by 24.4666 r. or	0,19285
But 2° ×,00742 inches or ,01484, in which the chain had lengthened since the brass measure was laid off	0,01484
The difference of which is the excess of the chain at the	INCHES.
temperature of 65° or	,11801
To which add 15° ×,00495 inches, or	,074225
Their sum will be what the chain has lengthened, or	,19226
	FEET.
Hence the length of the chain is	100,01602
Oct. 23d.—The brass measure was laid off, when the temperature was 65,1° and the chain was compared when the temperature was 65,7°, and then exceeded the 100 feet by 20,89166 r. or	0,11314
From which deduct 0.5° ×,00742 inches, or	0,00445
The difference is the excess at the temperature 65,1°	0,10899
To which add 15°,1 ×,00495 inches, or	0,07474
The sum is what the chain had lengthened	0,18373
And the length of the chain is	100,01531

Hence we have the length of the standard chain as follows:

By comparison, 21st, at 65,1° temperature	100,01589
22d, at 65,°	,01602
23d, at 65,1°	,01531
Mean, or length at temperate 65, 07°. feet	100,01574

And this may be called the meaſure at the temperate 50.°	
Now to have the exceſs of the old chain above the ſtandard one by theſe experiments, it was obſerved that on the 21ſt, the *ſtandard* chain exceeded the braſs meaſure by . .	0,11598
And the *meaſuring* one by	0,32797
The difference is therefore the exceſs of the meaſuring ſtandard chain.	0,21199
On the 23d, the ſtandard chain exceeded the braſs meaſure at the temperature 65.7°	0,11344
And the meaſuring chain exceeded at the temperature of 66.25° by	0,32701
Difference is the exceſs of the meaſuring chain above the ſtandard one	0,21357
From which deduct 0°,55+,00742, or . .	0,00408
The difference will be the exceſs at 65°,7 temperature .	0,20949
Exceſs on the 21ſt	0,21199
Mean of theſe two in inches. . . .	0,21074

In making theſe allowances for the change of temperature after the braſs meaſure was laid off, it is preſumed, that in ſo ſhort a time the brick wall, which was ſhaded by the tents, could not have ſuffered any change, eſpecially as the alteration in temperature was ſo trifling.

From comparing what the chain had lengthened by theſe laſt experiments, with what it had lengthened by thoſe made at *Bellary*, it appears that in that interval of time, or nineteen months, it had increaſed 0,0468 inches, or 00,384 feet, ſo that if we ſuppoſe the increaſe to be regular, it would have encreaſed from before the meaſurement at

Gooty, to the time of the experiments at *Bellary*, which was 24 months at the above rate 0,0048 feet, which deducted from 100,0119 feet, the length by the experiments at *Bellary*, we shall have the difference equal ,0071 feet, and therefore 100,0071 feet for the length of the standard chain previous to the measurement near *Gooty*, to which add ,01218 feet, which was the excess of the measuring chain above the other at that time, the length of the measuring chain was then 100,10728 feet, and that multiplied by 326, the number of chains measured, will give 32606,2853 feet, for the apparent length of the base. But this is supposing the increase in the length of the standard chain to be uniform which cannot have been the case, because ,1574 feet the excess of the standard chain above the brass measure in 1815, divided by 13, the number of years it has been in my possession, will only give ,0012 feet for each year, which is only half of what is deduced from the above rate; of ,0048 feet for two years. It is therefore more probable that for some years after the chain was in this country, it had remained unchanged, and that when the rust began to operate, it had lengthened rapidly, but where to mark the commencement it is impossible to say, unless we date it about the time when the irregularity was noticed in the comparative lengths, that is in the interval between the conclusion of the base near *Pallamcotah*, and the commencement of that near *Gooty*, and in order to make a correction, the most probable means will be to suppose that the standard chain had lengthened those divisions which appeared to be defective in the excess of the measuring chain when the comparison was made, previous to the measurement near *Gooty*, viz. 8,63 divisions. Now 8,63 divisions is equal to ,00345 feet, therefore if we suppose this to be the *only* lengthening from the rust, and that the measuring chain had lengthened from *use* only, we must in that case call the standard chain 100,00345 feet, and this at the temperature of

30°, because the quantity ,00345 feet could not be sensibly affected by any change of temperature. Then if to the above be added the excess of the measuring chain above the other, that is ,01218 feet, and the whole multiplied by 326, we shall have the apparent length of the base in this case 32605,0954 feet, which is most probably nearer the truth than the former allowance which gives the apparent length 32606,2853 feet, for if this be made use of, with its corrections, to compute back to the base near *Bangalore*, it would bring out that base upwards of two feet more than it measured, which would indicate that there must have been an excess in the standard chain, above 100 feet, as far back as 1804, which is not probable, if it has been correctly laid off in *London*.

	FEET
Taking therefore all these circumstances into consideration, we will take the apparent length of the base near *Goaty*	32605 0953
The correction for the wear equal	+0,3879
The correction for reducing the base to the horizontal distance will be	−0.4368
Hence the apparent horizontal distance will be	32605,0464
The correction for the expansion and reduced to the standard temperature of 62°	+5 4429
Hence the correct measure of the base	32610,4893
Which being reduced to the level of the sea	32608,6426

TRIANGLES *depending on the Base near Gooty, and carried northerly to the distance between Darroor station and Inpahgutt station.*

2. ANGLES.

At the North end of the Base (near Gooty.)

BETWEEN	AND	°	′	″	
South end of the Base.....	Gooty-droog station	87	27	16".5	
				21.5	
				20.5	
				17	
				15	16.45
				16.5	
				15	
				14	
				13.5	
				15	
	Boglemauricondah	105	36	22.5	
				22	25.25
				27	
				29.5	
	Paumdy station	35	4	0	
				1	
				7	
				4	
				3	2.45
				0	
				0.5	
				1.5	
				0	
				7.5	
Boglemauricondah	Boleecondah	51	14	22.5	
				20.5	
				21.5	24.33
				22	
				29.5	
				30	

Boglemauricondah	South end of the Base	105	36	25.25
South end of the Base,...	Paumdy hill	35	4	2.45

At the North end of the Base (continued.)

BETWEEN.	AND	°	′	″	
Paumdy hill, ...	Boglemauricondah, ...	70	32	22.8	
Boglemauricondah, ...	Boleecondah, ...	51	14	24.33	
Boleecondah, ...	Paumdy ſtation, ...	121	46	47.13	

At the South end of the Baſe near Gooty.

North end of the baſe	Gootydroog	27	13	59		
				67.5		
				67		
				70.5		
				58.5		
				64.5	62.64	
				65.5		
				64		
				55.5		
				56.5		
				58.5		
	Paumdy hill, ...	105	3	9 5		
				4		
				5.5		
				2.5	6.43	
				9		
				8.5		
				6		
Paumdy hill, ...	Boglemauricondah, ...	64	34	37		
				31		
				84		
				51	43.64	
				49.5		
				51		
				49		
North end of the baſe, ...	Paumdy hill	105	3	6.43		
Paumdy hill, ...	Boglemauricondah	64	34	42.64		
Boglemauricondah	North end of the baſe	41	28	27.79		

At Gooty Station.

BETWEEN	AND				
North end of the base	South end of the base	65	18	48 35·5 44 5 47 0 47 47 39 38 33 42 32	41.19
Paumdy	Guddacul station	67	2	57 59 52·5	56.17
Guddacul	Koclacondah	77	47	72·5 64 68·5 74 58	65.4
North end of the base	Namthabad	2	31	59·5 57 57·5 60	58 5
Paumdy station	South end of the base	21	16	32 75 37 36.5 29·5 27 5	32.65

South end of the base	North end of the base	65	18	41.19
North end of the base	Namthabad	2	31	58.5
Namthabad	South end of the base	67	50	39 69
South end of the base	Paumdy hill	21	16	32.65
Paumdy	Namthabad	46	34	7 04

At Boglemauricondah.

BETWEEN	AND	°	′	″		
North end of the base	South end of the base	33	55	14		
				12.5		
				8.5		
				12.5		12.5
				14.5		
				14.5		
				10.5		
				13		
North end of the base	Boleecondah	72	55	4.5		
				5.5		
				9.0		
				5.5		
				6		7.21
				6		
				6		
				7 5		
				11.5		
	Paumdy hill	65	1	33		
				32.5		
				25		31.25
				34.5		

At Paumdy hill.

North end of the base	South end of the base	39	52	55.5		
				54.0		
				50 5		
				50		52.25
				50		
				53		
				52.5		
South end of the base	Gooty station	26	26	15		
				14.5		
				18		
				19		17.56
				18.5		
				17		
				20		
				18.5		

At Paumdy (continued.)

BETWEEN	AND	°	′	″	″
Gooty ſtation	Boglemauricondah	57	52	39	
				46	
				42 5	42.5
				44	
				42	
				41.5	
	Boleecondah	40	44	9 5	
				10	
				12.5	
				13	11.36
				16	
				17	
				2.5	
	Namthabad ſtation	13	55	28.14	
				28.14	
				30.14	28.65
				28 69	
				28.14	
Gooty ſtation	Guddæul ſtation	88	42	29	
				29	
				27 5	
				27 0	
				27.5	
				28.5	30.5
				29.5	
				35	
				35	
				37	
N. end of the baſe	S. end of the baſe	39	52	52 21	
S. end of the baſe	Gooty ſtation	26	26	17.56	
Gooty ſtation	N. end of the baſe	13	26	34 65	
	Boglemauricondah	57	52	42 5	
Boglemauricondah	N. end of the baſe	44	26	7.85	
Boleecondah	Gooty ſtation	40	44	11.36	
Gooty ſtation — —	N. end of the baſe —	13	26	34.65	

At Paumdy (continued)

BETWEEN	AND	°	′	″
N. end of the baſe	Boleecondah	27	17	36.71
Guddacul ſtation	Gooty station	88	42	30. 5
Gooty ſtation	Boleecondah	40	44	11.36
Boleecondah	Guddacul ſtation	47	58	19.14

At Boleecondah.

N. end of the baſe	Boglemauricondah	55	50	24.5 24 27 25.4 29.5 30 27 38.5 38.5	29.28
Boglemauricondah	Paumdy hill	24	54	48.5 53. 48.5 55. 53.5 53.5 56.5 57.5	53.25
Paumdy hill.	Guddacul ſtation	94	43	54.5 53 5 58. 57. 54.5 56.5	55 67
Guddacul ſtation	Koelacondah	134	16	5.5 4 0 12.5 10 0	5.42

At Boleecondah (continued.)

BETWEEN	AND	°	′	″	
North end of the base	Boglemauricondah	55	50	29.28	
Boglemauricondah	Paumdy hill .. .	24	54	53.25	
Paumdy ſtation	North end of the baſe	30	55	36.03	

At Gudiacul ſtation.

Paumdy hill	Gooty ſtation ..	24	14	38.5		
				33		
				35	}	36.17
				40		
				[illegible]		
				38.5		
Gooty ſtation .. .	Koelacondah ...	30	12	37.5		
				34		
				[illegible]		
				47.5	}	45.63
				54		
				54.5		
				39		
				45.5		
Boleecondah	Koelacondah	17	9	29.5		
				31	}	31
				32.5		
Koelacondah	Arrakerrabetta	70	40	28.5		
				29.5		
				35.5	}	33.37
				40		

Paumdy hill	Gooty ſtation	24	14	36.17	
Gooty ſtation	Koelacondah	30	12	45.63	
Boleecondah	Paumdy hill	54	27	21.80	
	Boleecondah	17	9	31	
Boleecondah	Paumdy hill	37	[illegible]	52.80	

At Guddacul ſtation (continued.)

BETWEEN		AND		°	′	″	
Koelacondah	....	Arrakerrabetta	....	70	40	33.37	
		Gooty ſtation	....	30	12	45.63	
Gooty ſtation	....	Arrakerrabetta	....	100	53	19.0	

At Koelacondah.

Boleecondah	....	Guddaculbetta	....	28	34	25.5		
						26		
						25.5	}	26.″2
						27		
						27		
Guddacul	....	Arrakerrabetta	....	41	15	24		
						27.5		
						25.5		
						30	}	30.14
						33.5		
						35		
						35.5		
		Gootydroog ſtation		71	59	9.5		
						8		
						8.5		
						9		
						7.5	}	11.15
						9.5		
						7.5		
						18		
						17		
						17		
Arrakerrabetta	....	Adonidroog	....	33	10	38.5		
						36		
						42		
						38.5	}	39.14
						42.5		
						40.5		
						36		

At Koelacondah (continued.)

BETWEEN		AND		°	′	″	
Adonidroog	....	Poolycondah	....	40	27	42	
						45	
						44.5	
						47	40.5
						39	
						36	
						34 5	
						36.	
Gootydroog	....	Guddacul ftation	....	71	59	11.15	
Guddacul	....	Arrakerrabetta	....	41	15	30.14	
Arrakerrabetta	....	Gootydroog	....	113	14	41.29	
Arrakerrabetta	....	Adonidroog	....	33	10	39.14	
Adonidroog	....	Poolycondah	....	40	27	40.5	
Poolycondah	.. .	Arrakerrabetta	....	73	38	19.64	

At Arrakerrabetta.

Guddacul	. ..	Koelacondah	....	68	3	68	
						56.5	59.75
						53	
						61.5	
		Gootydroog		46	52	53	
						58.5	
						63	
						49.5	53.07
						50	
						51	
						46.5	
Koe acondah	...	Poolycondah	....	20	49	24.5	
						27.5	
						42.5	35.4
						41 5	
						41	

At Arrakerrabetta (continued.)

BETWEEN		AND.	°	′	″		
Poolycondah	....	Gootydroog	....	42	0	36	
						49 5	
						49	43 2
						43·5	
						37·5	
		Adonidroog	....	61	16	17	
						16	
						21	
						22 5	19 75
						24·5	
						17 5	
Guddacul		Koelacondah		68	3	59 75	
Koelacondah		Poolycondah		20	49	35·4	
Poolycondah		Guddacul		88	53	35·15	
Guddacul		Gootydroog		46	52	53 07	
Gootydroog		Poolycondah		42	0	42.08	
Ditto		Ditto (observed direct)		42	0	43 10	
			Mean	42	0	42.59	

At Poolycondah.

Arrakerrabetta	Koelacondah	85	32	5·5		
				11		
				8·5		6.67
				3·5		
				5		
				6 5		
Koelacondah	Gootydroog	4	2	28		
				29		
				22		23.67
				17		
				24		
				22		
Arrakerrabetta	Adonidroog	38	19	9·5		
				2·5		
				3 5		4 7
				3 5		
				4 5		

At Poolycondah (continued.)

BETWEEN	AND	°	′	″		
Adonidroog	Kerra Bellagul	73	37	18.5		
				18.5		
				21.5		
				21	}	19 5
				20.5		
				15.5		
				21		
Arrakerrabetta	Koelacondah	65	32	6.67		
Koelacondah	Gootydroog	4	2	23.67		
Gootydroog	Arrakerrabetta	89	31	30.34		

At Adonidroog.

Arrakerrabetta	Poolycondah	80	24	35.5		
				35		
				35.5		
				35		
				38		
				35.5		
				41.5	}	37.64
				39		
				40		
				41.5		
				38		
				35.5		
				38.5		
				38.5		
Poolycondah	Kerra Bellagul	52	37	47		
				51		
				49.5		
				46		
				46	}	46.89
				46		
				45		
				45		
				46		
Kerra Bellagul	Malliabad hill		58	45 59.		
				56		
				57		
				54.5	}	55 57
				58.5		
				52		
				57		

ON THE MERIDIAN.

At Kerra Bellagul.

BETWEEN	AND	°	′	″		
Adonidroog, ...	Poolycondah	53	44	63 5		
				58.5		
				61.5		
				63 5		
				56	}	59.94
				58		
				63		
				56 5		
				59		
	Malliabad	68	12	52		
				55		
				56		
				49.5		
				49	}	52.78
				48		
				51		
				56		
				58.5		
Malliabad hill	Darroor hill	41	35	35		
				32		
				36		
				38	}	34.43
				32		
				33.5		
				34		

At Malliabad hill.

Adonidroog	Kerra Bellagul.....	53	1	21		
				18.7		
				20.7		
				18		
				20.7		
				14 5	}	17 61
				9.5		
				16.2		
				18		
				18		
				19		
				17		

At Malliabad hill (continued.)

BETWEEN	AND	°	′	″	
Kerra Bellagul	Darroor hill	62	16	15.7	20.47
				21.5	
				25.8	
				23	
				22.5	
				14	
				19.7	
				18.5	
				20.5	
				23.5	
Darroor hill	Kotapilly hill	67	52	24.2	25.0
				27.3	
				14.7	
				28.3	
				25.3	
				24.5	
				19.5	
				27	
				30	
				29.2	

At Darroor hill.

Kerra Bellagul	Malliabad	76	8	7.6	9.3
				8	
				13	
				6.5	
				0.7	
				11.8	
				15.4	
				13	
				9	
				8	
Malliabad hill	Kotapilly hill	59	31	59	60
				60.3	
				71.6	
				60.3	
				52.9	
				58.6	
				7[illegible].2	
				50	
				57.5	

3. PRINCIPAL TRIANGLES.

N. end of the base from the S. end of the base 32608.54 feet.

Number.	TRIANGLES.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
1	N. end of the base,	87 27 16.45	—0.07			87 27 16.3	
	S. end of the base,	27 14 2.64	—0.03			27 14 2.6	
	Goolydroog station,	65 18 41.19	—0.03			65 18 41.1	
		180 00 00.28		0.13	+0.15	180 00 00.0	
	Goolydroog station from	N. end of the base,					16125.9
		S. end of the base,					35853.8
2	N. end of the base,	105 36 25.25	—0.19			105 36 25	
	S. end of the base,	40 28 22.79	—0.04			40 28 22.7	
	Boglemauricondah,	33 55 12.5	—0.05			33 55 14.3	
		180 00 00.54		0.28	+0.26	180 00 00.0	
	Boglemauricondah from	N. end of the base,					37929.3
		S. end of the base,					56280.2
3	N. end of the base,	35 4 2.45	—0.03			35 4 2.4	
	S. end of the base,	105 3 6.43	—0.15			105 3 6.	
	Paundy hill,	39 52 52.21	—0.04			39 52 51.6	
		180 00 1.09		0.22	+0.87	180 00 00.0	
	Paundy hill from	N. end of the base,					49111.3
		S. end of the base,					29218.8

N. end of the base from Boglemauricondah 37929.3 feet.

4	N. end of the base,	51 14 24.33	—0.09			51 14 24.1	
	Boglemauricondah,	72 55 7.21	—0.12			72 55 6.9	
	Boleecondah,	55 50 29.28	—0.10			55 50 29.0	
		180 00 00.82		0.31	+0.51	180 00 00.0	
	Boleecondah from	N. end of the base,					43814.8
		S. end of the base,					35742.4

N. end of the base from Boglemauricondah=37929.3 feet.

Numbers.	TRIANGLES.	Observed Angles.	Difference.	Spherical Excess.	Errors.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	N. end of the base,	70 32 22.80	−0.16			70 32 22.2	
	Boglemauricondah,	65 1 31.25	−0.14			65 1 30.6	
5	Paumdy hill,	44 26 7.85	−0.12			44 26 7.2	
		180 00 1.90		0.42	+1.48	180 00 00.0	
	Paumdy hill from	N. end of the base,					49110.8
		Boglemauricondah,					51081.7

N. end of the base from Bolecoondal=43814.8

	N. end of the base,	121 46 47.13	−0.45			121 46 46.7	
	Bolecoondah,	30 55 36.03	+0.02			30 55 36.1	
6	Paumdy hill,	27 17 36.71				27 17 37.2	
		179 59 59.87		0.43	−0.56	180 0 0	
	Paumdy hill from	N. end of the base,					49107.4
		Bolecoondah,					81225.7

Gooty station from the S. end of the base=35853.8

	Gooty station,	67 50 39.69	−0.04			67 50 39.7	
	S. end of the base,	27 14 2.64	−0.03			27 14 2.6	
7	Namthabad station,					84 55 17.7	
						180 0 0.0	
	Namthabad station from	Gooty station,					16472.3
		S. end of the base,					38837.3

Gooty station from Paumdy hill=59671.6

	Gooty station,	46 34 7.04	+0.06			46 34 7.1	
	Paumdy hill,	13 55 28.65	−0.03			13 55 28.6	
8	Namthabad station,					119 30 24.3	
						180 0 0	
	Namthabad station from	Gooty station,					16472.1
		Paumdy hill,					49718.1

N. end of the base from Paumdy hill = 49110.8 feet.

Number.	TRIANGLES.	Observed Angles.	Differences.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	N. end of the base,	121 46 47.18	−0.45			121 46 46.7	
	Paumdy hill,	27 17 36.71				27 17 37.2	
9	Boleecondah,	30 55 36.03	+0.02			30 55 36.1	
		179 59 59 92		0 43	−0.51	180 0 0.	
	Boleecondah from { N. end of the base,						43818 2
	Boleecondah from { Paumdy hill,						81231.8

Boleecondah from Paumdy hill = 81228 75.

	Boleecondah,	94 43 55.67	−1.04			94 43 53.5	
	Paumdy hill,	47 58 19.14	−0.43			47 58 17.	
10	Guddacul hill,	37 17 50.8	−0.44			37 17 49.5	
		180 0 5 61		1.91	+3.70	180 0 0.	
	Guddacul from { Boleecondah,						99575.5
	Guddacul from { Paumdy hill,						133595.5

Paumdy hill from Guddacul = 133595.5.

	Paumdy hill,	88 42 30.5	−0 91			88 42 29.5	
	Guddacul hill,	24 14 36.17	−0.48			24.14 35.5	
11	Gootydroog,	67 2 56.17	−0 50			67. 2 55.	
		180 0 2.84		1.89	+0 95	180 0 0.	
	Gootydroog from { Paumdy hill,						59571.6
	Gootydroog from { Guddacul hill,						145043.8

Guddacul station from Gootydroog = 145043.8.

	Guddacul,	30 12 45.69	−0.69			30 12 45.	
	Gootydroog,	77 48 6.4	−1.00			77.48 .4.5	
12	Kuelacondah,	71 59 11.15	−0.89			71 59 10.5	
		180 0 2.18		2.58	−0.40	180 0 0.	
	Kuelacondah station from { Guddacul,						149076.1
	Kuelacondah station from { Gootydroog,						76745.3

Guddacul station from Bolecondah = 99575.5 feet.

Number.	TRIANGLES.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Guddacul,	17 9 31.	+0.22			17 9 30.4	
	Bolecondah,	134 16 5.42	−1.80			134 16 3.6	
13	Koelacondah,	28 34 26.2	+0.55			28 34 26.0	
		180 0 2.62		1.04	+1.58	180 0 0.0	
	Koelacondah from	Guddacul station,					149082.0
		Bolecondah,					61419.2

Guddacul from Koelacondah = 149079.05.

	Guddacul,	70 40 33 37	−1.29			70 40 32.2	
	Koelacondah,	41 15 30.14	−1.00			41 15 29 2	
14	Arrakerrabetta,	68 3 59.75	−1.25			68 3 58.6	
		180 0 3.26		3 54	−0.28	180 0 0.	
	Arrakerrabetta from	Guddacul					105981.9
		Koelacondah,					151657.5

Gooty station from Guddacul = 145046.6

	Gooty station,					32 13 50.8	
	Guddacul station,	100 53 19 7	−2.23			100 53 16.8	
15	Arrakerrabetta,	46 52 53.07	−0 63			46 52 52.4	
						180 0 0	
	Arrakerrabetta from	Gooty station,					195133 7
		Arrakerrabetta,					105978.6

Koelacondah from Arrakerrabetta = 151657.5

	Koelacondah,	73 38 19.53	−0.57			73 38 19	
	Arrakerrabetta,	20 49 36.4	−0,48			20 39 35	
16	Poolycondah,	85 32 6 67	−0.32			85 33 6	
		180 0 17.1		1.87	−0.16	180 0 0	
	Poolycondah from	Koelacondah,					54[illegible]4
		Arrakerrabetta,					145956.9

Arrakerrabetta from Gootydroog=195133.7 feet.

Numbers.	TRIANGLES.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	Arrakerrabetta,	42 0 42,59	—1.18			42 0 41.4	
	Gootydroog,					48 24 50.5	
17	Poolycondah,	89 34 30.34	—2.25			89 34 28.1	
		180 0 0.0				180 0 0.0	
	Poolycondah from					Arrakerrabetta,	145056.4
						Gootydroog,	130602.7

Arrakerrabetta from Poolycondah= 45957.65

	Arrakerrabetta,	61 16 42.75	—0.85			61 16 19.	
	Poolycondah,	38 19 4.7	—0.76			38 19 4.5	
18	Adonidroog,	80 24 37.64	—1.18			80 24 36.6	
		180 0 2.09		2.79	+0.70	180 0 0	
	Adonidroog from					Arrakerrabetta,	91779.9
						Poolycondah,	129805.9

Poolycondah from Adonidroog=129805.9

	Poolycondah,	73 37 19.5	—1.47			73 37 18.3	
	Adonidroog,	52 37 46.89	—1.15			52 37 45.9	
19	Kerra Bellagul,	53 44 59.94	—1.16			53 44 58.4	
		180 0 6.33		3.78	+2.55	180 0 0.0	
	Kerra Bellagul from					Poolycondah,	127920.1
						Adonidroog,	154429.5

Adonidroog from Kerra Bellagul=154429.5

	Adonidroog,	58 45 55.57	—1.83			58 45 53.6	
	Kerra Bellagul,	68 12 52.78	—2.05			68 12 50.6	
20	Mallabad hill,	53 1 17 61	—1.75			53 1 15.8	
		180 0 5.96		5.63	+0.33	180 0 0	
	Mallabad from					Adonidroog,	179506.1
						Kerra Bellagul,	165291.7

Kerrae Bellagul from Mariaba = 165291.7 feet.

Number	TRIANGLES.	Observed Angles.	Differences	Spherical Excess	Error.	Angles for Calculation.	Distances in Feet.
	Kerrae Bellagul,	41 35 34.43	—1.11			41.35.33.2	
	Malliab-d,	62 16 20.47	—1.26			62 16.19.1	
21	Darroor hill,	76 8 9.3	—1.56			76. 8 7.7	
		180 0 4 2		3 99	+0 27	180 0 0.	
	Darroor hill from	Kerrae Bellagul,					150701.3
		Malliabad,					113018.2

Malliabad from Darroor hill = 113018.2

	Malliabad,	67 52 25.	—1.10			67 52 23.	
	Darroor hill,	59 32 0.64	—1.09			59 31 58.8	
22	Kotapilly hill,	52 35 40.06	—0 94			52 35 38.2	
		180 0 5 70		3 08	+2.66	180 0 0.	
	Kotapilly hill from	Malliabad,					122632 1
		Darroor hill,					131799 1

Darroor hill from Kotapilly hill = 131799.1

	Darroor hill,	46 39 10 28	—1.07			46 39 9 2	
	Kotapilly hill,	84 48 40.71	—1.84			84 48 38.8	
23	Impahgutt,	42 32 13 04	—1.08			48 32 12.	
		180 0 4.02		3 99	+0 03	180 0 0.	
	Impahgutt from	Darroor hill,					175156.7
		Kotapilly hill,					127899.0

4. DESCRIPTION OF THE GREAT STATIONS.

Base.—North end; in the flat cotton ground about three miles weſt of *Gooty*, and near the village of *Namthabad*.—It is ſituated on a riſing ground, marked by a circular platform of brick and chunam with a ſtone and circle, the center of which aſcertains the extremity of the baſe.

South end.—Lies nearly a mile north of the village of *Eeranapully*, and is ſimilarly marked with the former one.—Under the maſonry of both theſe platforms, the extremities of the baſe are alſo defined by ſtones with circles fixed when the foundation was laid, and correſponding with thoſe above.

Gootydroog.—On the higheſt point of that *Droog*; while obſerving, the flag ſtaff was removed. It was afterwards replaced and marks the ſtation.

Boglemauricondah.—A conſpicuous hill on the range lying about ten miles weſt from *Gooty*.—The road to the ſummit is on the ſouth ſide of the hill, leading from *Nagſundrum*, a conſiderable village about two miles ſouth from the hill.—The ſtation is on the ſummit marked by a platform and a ſtone with a circle.

Paumdy hill.—A long hill running nearly eaſt and weſt; and about two miles north of the village of *Paumdy* and the *Penna* river.—The ſtation is on a platform, and the center marked as uſual.

Bolecondah.—This is a low white rocky hill about ten miles N. W. from *Gooty*, and north of the village of *Pothakacherroo*, about one and half miles diſtant. The great road from *Gooty* to *Bellary* running between

the hill and the village.—The ſtation is marked on a rock by a circle.

Guddacul Pagoda.—On the platform of the pagoda marked as uſual. The village and hill are well known, being about half the diſtance between *Gooty* and *Bellary*.

Koelacondah.—This hill is about 14 miles north from *Gooty* in the *Chinumpully* talook, and two miles from the village of that name.—On the ſummit of a large detached ſtone marked as uſual, is the ſtation.

Arrakerrabetta.—The ſtation is on a range of hills North East of *Gooleum*, and about three miles weſt from *Auloor*.—*Arrakerra*, a conſiderable village, from which the ſtation derives its name is not far ſouth. The ſtation is marked by a ſtone and circle in the center of a platform.

Poolycondah.—In the *Davuncondah* talook about four miles ſouth from *Davuncondah*. The hill takes its name from a ſmall village ſituated on a height about two miles N. W. of the hill.—The ſtation is marked by a high platform, ſtone, &c.

Adonidroog.—This place is too well known to need any deſcription farther than that the ſtation is on a ſtone building on the higheſt part of the *Droog*, marked.

Kerrae Bellagul.—A low hill about half a mile eaſt from the village of *Kerrae Bellagul*, and about ſeven miles ſouth from the *Toongabudra*. The ſtation is marked on a rock by a circle.

Malliabad.—In the territories of His Highneſs the *Nizam*, and the higheſt of a range of hills running ſouth from *Raichoor*, and about five

miles distant. The great road from *Bellary* to *Hydrabad* runs about two miles east from the hill, and the village of *Malliabad* is about one mile north.—The station is marked on the rock by a circle.

Darroor hill.—This hill as also *Malliabad* is in the *Dooab.*—*Darroor* is a peaked hill about two and a half miles west from the village of that name, and about nine miles west from *Guddawaul.* The river *Kistna* runs about seven miles north from the hill.—The station is marked on a rock by a circle.

Kotapilly hill.—About six miles north of the *Kistna*, and about ten miles S. W. from *Muktul*, having *Gooda Belloor*, a well known place between it and the *Kistna*; the village of *Kootapilly* is on the north side of the hill about half a mile distant.—The station is on a rock marked by a circle.

Inpalgutt.—The highest of a conspicuous range of hills lying between *Ootkoor* and *Kotacondah-Droog*, and about four miles south of *Kotacondah.*—*Trimallahpoor*, a small village from which the road to the station leads, is about two miles north of the hill.—The station is on a rock, marked by a circle.

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Triangles depending on the baſe near Daumergidda, and carried ſoutherly to the diſtance between Inpahgutt and Darroor Hill.

5. MEASUREMENT OF THE BASE LINE NEAR DAUMERGIDDA.

Experiments made for comparing the chains after the measurement.

1815.	Excess of the old chain.	REMARKS.
	Divisions.	
February 15th, A. M.	45.2	
	46.	
	46.	
	46.	
	45.	
P. M.	46.	Mean Temperature during these Experiments, was 61°
	46.6	
	46.2	
	45.5	
A. M.	45.5	
	[illegible]	
	[illegible]	
	45.	
	45.5	
	45.	
	45.	
Mean	45.63	

Note.—45.63 divisions of the micrometer is equal to ,01828 feet, and at Hydrabad, where the comparisons were made, the old chain exceeded the new one ,01756 feet; the difference, equal to ,0072 feet is the wear.

TABLE CONTAINING THE PARTICULARS OF THE MEASUREMENT.

No. of the Hypothenuse.	Length of each in Feet.	Angles of Elevn. and Depn.			Deductions from each Hypothenuse.	Perpendicular.		Commencement. from the last.		Mean Temperature.	REMARKS.
						Ascents.	Descents.	Above.	Below.		
		°	′	″	Feet.	Feet.	Feet.	Inches.	Inches.	°	
1	300	0	51	48	.03405	4.52		27.0		74.	Commenced on the 23d January, 1815.
2	300	0	8	33	.00093		0.75		5.	85.5	
3	300	0	38	12	.01851		3.33		2 5	95.3	
4	7 X0	0	26	18	.02051		5.36		12.5	88.	
5	500	0	37	57	.03654		6.02			74.	
6	500	0	42	0	.03730		6.11		12 7	92.	
7	500	0	50	0	.05290		7.27		11 2	91.3	
8	500	1	2	51	.08355		9.14		8.6	86 7	
9	400	0	32	24	.01776		3.77	12.5		75.7	
10	400	0	46	48	.03708		5.45		21.	77.3	
11	600	0	36	53	.03450		6.41		11.5	94.5	
12	600	0	16	57	.00746		2 96	11.5		69.3	
13	600	Level						18		91 8	
14	200	1	24	21	.06020	4.91		4		70.9	
15	600	0	54	45	.03066	6.06			2.	70.9	
16	600	0	11	0	.00306	1.92			7.8	95.3	
17	800	0	17	57	.01088		4.18		4.4	88.	
18	700	0	56	54	.01032		7.51		2.	72 6	
19	800	0	51	15	.08888		11.93		15.8	93.1	
20	400	0	26	6	.01152		3.01			102.8	
21	300	0	16	42	.00354		1.46		9.	61 6	
22	700	0	21	57	.01828	4.47		22.4		71.4	
23	600	0	6	14	.00198		1 09		8.	96.9	
24	400	0	6	48	.00168		0.73		13.5	102.7	
25	300	0	7	12	.00056	0.63		11.8		85.	
26	800	0	59	3	.11804		18.74		9.2	87.2	
27	400	2	52	51	.50552		20.1	4 2		101.2	
28	300	1	24	33	.09075		7 38	12.5		64.1	
29	600	0	9	39	.00234		1.68	6.3		77.5	
30	700	0	45	31	.05139	9.27		5.6		92.4	
31	500	0	5	24	.00065		0.79		9.7	101.1	
32	300	0	45	53	.02673		4.0		8.6	66.6	
33	400	0	35	25	.02122		4 12		12.6	87.7	
34	200	0	0	18			0.02	7.3		100.9	

No. of the Hypothenuse.	Length of each in feet.	Angles of Elevs. and Dep.	Deductions from each Hypothenuse.	Perpendicular. Ascents	Perpendicular. Descents	Commencement from the last. Above.	Commencement from the last. Below.	Mean Temperature.	REMARKS
		° ′ ″	Feet.	Feet.	Feet.	Inches	Inches.	°	
35	100	2 11 30	.07316	3.82		4.2	,,	102.0	
36	700	1 10 16	.14623	14.31		3.5	,,	65.7	
37	300	0 45 54	.02673	4.09		,,	11.	82.7	
38	600	1 43 9	.27506	18.00		9.5	,,	90.2	
39	600	1 25 45	.18666	14.96		,,	3.4	71.9	
40	400	0 45 0	.03488	5.24		,,	11.7	65.2	
41	400	0 5 36	.00052	0.65		,,	12.	80.	
42	400	0 14 8	.00340		1.64	7.6	,,	92.6	
43	300	0 36 32	.01695		3.19	,,	3.	83.9	
44	200	0 56 54	.02740		3.31	,,	0.7	83.5	
45	300	1 38 48	.12387		8.62	,,	17.	80.9	
46	100	3 0 0	.13705		5.23	,,	12.75	91.	
47	400	1 50 0	.20176	12.8		3.		100.3	
48	300	0 58 24	.04329	5.1		,,	13.	102.3	
49	500	0 40 0	.02210	1.45		,,	12.7	56.2	
50	700	0 20 54	.01295		4.26	4.	,,	76.7	
51	400	Level				14.8	,,	87.7	
52	800	0 13 15	.00800	3.08		4.	,,	90.	
53	700	0 20 0	.01188	4.07		9.7	,,	859	
54	400	Level				,,	7.5	86.3	
55	700	0 50 0	.07406		10.18	,,	6.4	95.8	
56	400	0 31 0	.01628		3.61	8.	,,	109.6	
57	1000	1 2 27	.16500		18.15		2.2	89 7	
58	800	1 22 30	.23032		19.20	8.5	,,	96 2	
59	400	0 32 45	.01816	3.81		20.6	,,	100.5	
60	300	1 18 9	.07752	6.82		12.5		88.5	
61	600	1 29 0	.20106	15.53			1.	61.9	
62	800	1 41 51	.35104	23.7		9.5	,,	87.5	
63	300	0 12 33	.00201		1.1		11.7	101.7	Completed on the 13th February, 1815.
		Descent from the termination of the Base to the ground						37.0	
	30800		3.93546	169.12	217.47	261.6	360.65	83.93	

East end of the Base above the West end, in perpendicular height=56.6 feet.

By the comparisons made at Hyderabad, the old chain with which the measurement was made, exceeded the new one .01756 feet, and the new or standard chain exceeded the 100 feet by the brass standard .01574 feet. Then .01756 × .01574 = .03330 feet, for the excess of the old chain above 100 feet. Therefore 308 × 100.03330 feet will give the length of the Base. . . . . *Feet.* 30810.2564

At the conclusion, the old chain exceeded the new one 45.63 divisions of the micrometer equal .01828 feet, and had therefore increased by wear .00072 ft. Hence $308 + \frac{.00072}{4} = .11088$ feet, the correction for the wear, which add, . . × 0.1109

The sum of the deductions (from col. 4th) is 3.93586 feet, which being increased in the ratio of 100 to 100.03330 feet, will give, 3.9372 feet, which subtract . . . . . —3.9372

Hence the apparent horizontal distance, will be . . 30806,4301

The correction for the expansion, and reduced to the standard temperature of 62° will be $\frac{(83.93-50)\times.0074-(62-50)\times.01237}{12} = 308.060301 - 2.6352$ feet, which add, ... +2,6352

Hence the corrected measure of the Base for the temperature of 62° will be 30809,0653

Which being reduced to the level of the sea, by taking the mean height of the Base above that level to be 1917 feet, we have for the whole length of the Base, ... 30806.237

6. ANGLES.

At the West end of the Base.

BETWEEN	AND	°	′	″	
Malliga hill	Daumergidda	82	38	48.5	
				46	
				55.5	
				44	46.57
				44	
				44	
				44	
East end of the Base	Malliga.....	75	33	29	
				38	
				37	
				36	
				26	32.12
				36.5	
				32.5	
				32	

At the East end of the Base.

West end of the Base	Malliga hill	75	39	23	
				22	
				29	
				29	
				23.5	24.6
				22	
				22.5	
				22.5	
				26.5	
				26	

At Malliga hill.

BETWEEN	AND	°	′	″		
West end of the Base	East end of the Base	28	46	69		
				68.5		
				65		
				59.5		
				69.5		
				70	65.2	
				64.5		
				61.5		
				60		
				70		
				58		
	Daumergidda	26	15	27		
				29		
				27		
				27		
				31.5		
				33.5	29.41	
				27.5		
				30.5		
				28.5		
				32.5		
				29.5		
Daumergidda	Doodallah	59	49	32.5		
				33		
				26.5		
				30		
				33		
				23		
				23		
				35		
				34	29.67	
				29		
				27.5		
				32.5		
				22		
				33		
				31		
Doodallah	Sheelapilly	74	20	55.5		
				59.5		
				55.5		
				58		
				59	57.55	
				58.5		
				57		
				58.5		
				56.5		

At Daumergidda.

BETWEEN	AND	°	′	″		
West end of the Base	Malliga hill	71	5	48		
				44		
				41		
				42		"
				47·5	}	43·4
				41		
				46		
				40·5		
				40·5		
Malliga hill	Doodallah	78	20	30·5		
				24		
				23·5		
				22		
				21		
				31	}	25·95
				28·5		
				19·5		
				26·5		
				26·5		
Doodallah	Sheelapilly	59	20	47		
				47		
				43		
				46		
				48		
				45	}	44·95
				41		
				43		
				43·5		
				45		
				45·5		

At Doodallah.

Daumergidda	Sheelapilly	70	25	55·5		
				52		
				55·5		
				51·5		
				53	}	
				55		
				41		
				44·5		
				54		

At Doodallah (continued.)

BETWEEN	AND	°	′	″	
Malliga hill	Sheelapilly hill	28	35	45	
				45·5	
				44·5	
				43	43·56
				42·5	
				39·5	
				43·5	
				45	
Sheelapilly	Goraegutt	42	40	31	
				31	
				33	
				36	
				37	
				37	
				32	
				31	31·53
				35	
				31	
				26	
				28·5	
				29	
				29·5	
				26	
Goraegutt	Taud Munnoor	41	8	45·5	
				50·5	
				51	
				46	49·1
				51	
				49·5	
				48	
				51·5	
	Topecondah	31	23	26	
				21·5	
				25	24·1
				24	
Sheelapilly hill	Goraegutt	42	40	31·53	
Goraegutt	Taud Munnoor	41	8	49·1	
Sheelapilly hill	Taud Munnoor	83	49	20·63	
Daumergidda	Sheelapilly	70	25	51·67	
Sheelapilly	Malliga hill	28	35	43·56	
Malliga hill	Daumergidda	41	50	8·11	

At Sheelapilly.

BETWEEN	AND		′	″		
Malliga hill	Doodallah	77	.8	24.5		
				26.5		
				26.5		
				25		
				26		25.72
				22.5		
				26.5		
				27		
				29		
Daumergidda	Doodallah	50	13	27		
				24.5		
				28.5		
				27		
				27		
				.5		26 68
				24		
				27.5		
				30		
				23		
				28.5		
Doodallah	Coraegutt	73	49	7		
				9.5		
				3.5		
				5		
				2.5		
				9		
				9.5		6.42
				6.5		
				5		
				9.5		
				8.5		
				1.5		
Coragutt	Kotamarpilly	29	59	25		
				27.5		
				26		
				32.5		28.26
				31		
				27		

At Taud Munnoor.

BETWEEN	AND	°	′	″	
Goraegutt	Sheelapilly	42	43	45.5	
				54	
				51.5	
				48.5	52.0
				53.5	
				54	
				54	
				55	
	Doodallah	106	19	16.5	
				16	
				18.5	
				16.5	
				11.5	
				13 5	15.96
				13	
				17	
				16.5	
				16.5	
				20.0	
	Topecondah	59	4	9 5	
				7.5	
				13	
				19	
				15	
				11.5	
				11	11.7
				7.5	
				9	
				13	
				12	
				14	
				10	

At Goraegutt.

Sheelapilly	Doodallah	63	30	29.5	
				21	
				24 5	
				22.5	
				21.5	
				22.5	
				21	22.19
				21	
				18 5	
				22	
				21 5	
				27 5	
				18 5	
				26.5	

At Goraegutt (continued.)

BETWEEN	AND	°	′	″			
Sheelapilly	Kotamarpilly	111	15	26.5			
				22			
				20.5			
				25.5			
				15			
				19		22.4	
				19			
				27.5			
				27			
				22			
dTau Munnoor	Topecondah	82	33	21.5			
				22			
				21			
				27.5			
				24 5			
				21			
				31		23 25.	
				21.5			
				27 5			
				21			
				22			
				23			
Topecondah	Kotamarpilly	69	8	26.5			
				57			
				55.5			
				57			
				56 5			
				58			
				58			
				56 5		57.09	
				58			
				59			
				55			
				55			
				56			
Taud Munnoor	Doodallah	32	31	58 5			
				55			
				57.5			
				57.5			
				57			
				58			
				59 5		57.38	
				55			
				59			
				59 5			
				61			
				57 5			
				57 5			

At Goraegutt (continued.)

BETWEEN	AND	°	′	″
Taud Munnoor	Topecondah	83	33	23.25
Taud Munnoor	Doodallah	32	31	57.83
Doodallah	Topecondah	416	5	21.08

At Kotamarpilly.

Sheelapilly	Goraegutt	38	45	16.5		
				8		
				14		
				13.5		12.1
				10.5		
				14.5		
				12		
Goraegutt	Peecha Raggeddy	65	26	45		
				54.5		
				52		
				52.5		
				51.5		50.65
				54		
				42		
				41.5		
				56		
				51.5		
Sheelapilly	Peecha Raggeddy	26	41	37.5		
				29 5		
				33 5		35
				36		
				35.5		
				38		
Peecha Raggeddy	Annantagherry	142	3	26		
				24.5		
				21.5		
				36.5		
				25.5		
				31.5		30.71
				29		
				28.5		
				39.5		
				34		
				35		
				27		

At Kotamarpilly (continued.)

BETWEEN	AND	°	′	″		
Annantagherry	Kotakoddangul	37	3	45		
				45		
				31.5		
				37		36.37
				32		
				40.5		
				35.5		
				34.5		
Goraegutt	Topecondah	76	25	5		
				5		
				2.5		
				3		
				5.5		
				6		4.87
				7.5		
				3		
				4		
				6		
				6		
Topecondah	Annantagherry	76	4	39		
				36.5		
				30		
				33.5		
				34.5		
				36		
				32.5		
				32		33.83
				31.5		
				30.5		
				31		
				36		
				31		
				38.5		
				25		
Peecha Raggeddy....	Goraegutt	65	26	50.05		
Goraegutt	Sheelapilly	38	45	12.10		
Sheelapilly	Peecha Raggeddy	26	41	37.95		
Ditto	Ditto observed direct	26	41	35.0		
	Mean =	26	41	36.47		
Peecha Raggeddy	Annantagherry	142	3	30.71		
Annantagherry	Sheelapilly	168	45	7.18		
Annantagherry	Kotakoddangul	37	3	36.37		
Kotakoddangul	Sheelapilly	131	41	30.81		

At Topecondah.

BETWEEN	AND	°	′	″		
Annantagherry	Kotamarpilly	43	34	53·5		
				46·5		
				52·5		
				53·5		
				52·5		
				50		
				56 5		
				49		
				54		
				51·5		52·93
				54		
				52		
				54 5		
				57		
				54		
				53		
				54·5		
				57		
				51		
Kotamarpilly	Goraegutt	34	25	57		
				60·5		
				58·5		
				60·5		
				60·5		
				60		
				60		
				61		
				61		59·77
				60·5		
				59		
				59·5		
				61		
				62·5		
				57		
				56·5		
				61		
Goraegutt	Doodallah	32	31	18		
				17		
				15 5		
				19·5		
				15·5		17·33
				20·5		
				19·5		
				15 5		
				15·		

At Topecondah (continued.)

BETWEEN	AND	°	′	″		
Goraegutt	Taud Munnoor	37	22	23		
				23·5		
				25		
				31·5		
				26		
				29		26.36
				29 5		
				27·5		
				23		
				28.5		
				23		

At Annantagherry:

Purgy hill	Kotakoddangul	76	9	44		
				58		
				41·5		
				51		
				51·5		
				48		
				46 5		50.58
				56·5		
				54·5		
				54		
				57		
				53·5		
				41·5		
Kotakoddangul	Thuttapilly hill	69	27	39		
				35·5		
				36·5		33.67
				29		
				27·5		
				34·5		
Thuttapilly	Kotamarpilly	46	12	48.5		
				64·5		
				54·5		
				64 5		59.0
				60		
				60.5		
				60.5		
Kotakoddangul	Thuttapilly	69	27	33	67	
Thuttapilly	Kotamarpilly	46	12	59	0	
Kotamarpilly	Kotakoddangul	115	40	32	67	

At Purgy hill.

BETWEEN		AND		°	′	″	
Pochamagutt	....	Kotakoddangul	....	79	55	6.5	
						18	
						2.5	
						10.5	
						17.5	
						17.5	11.42
						9.5	
						11.5	
						9	
						13	
						17	
						11 5	
Kotakoddangul	....	Annantagherry	....	80	10	19.5	
						10	
						13.5	
						11	
						13	13 9
						13	
						11.5	
						14.5	
						19.5	

At Kotakoddangul.

Tapahgutt	....	Pochamagutt	....	57	0	49	
						57	
						51	
						57.5	56.19
						62	
						53.5	
						58.5	
						61.0	
						54	
						56	
						57.5	56.20
						56	
						57.5	

Mean = 56.195

At Kotakoddangul (continued.)

BETWEEN	AND	S	'	"		
Pochamagutt	Purgy hill	47	58	31		
				30.5		
				26		
				33.5		
				20		"
				28.5		26.85
				28		
				22.5		
				26.5		
				22		
				30.13		
				28.13		
				26.63		27.93
				28.13		
				26.63		
				Mean	=	27.39
Purgy hill	Annantagherry	23	39	59		
				54.5		
				49.5		
				59		
				59.5		
				54.5		56 87
				54		
				63.5		
				59		
				54.5		
				58.0		
Annantagherry	Thuttapilly	48	43	37		
				37		
				24.5		
				26.5		
				32		
				26.5		
				23.5		27.35
				24.0		
				25.5		
				28		
				22		
				22		
				26.5		
Thuttapilly	Kotamarpilly	21	27	36.5		
				31.5		
				31		
				34		
				35.5		33.5
				30.5		
				35.5		
				33.5		

At Kotakoddangul (continued.

BETWEEN	AND	°	′	″		
Inpahgutt	Kaunkoortee	39	2	34·2		
				34·1		
				49·3		
				39·8		39·4
Annantagherry	Thuttapilly	48	43	27·35		
Thuttapilly	Kotamarpilly	21	27	33·5		
Kotamarpilly	Annantagherry	27	15	53·85		

At Pochamagutt.

Kotakoddangul	Purgy hill	52	6	26·7		
				24·8		
				25·5		
				26·2		
				27		25·4
				24·5		
				23·5		
				25		
Inpahgutt	Kotakoddangul	73	56	57·2		
				59·1		
				68·3		
				67·6		65·3
				70·9		
				68		

At Kaunkoortee.

Kundakoor	Inpahgutt	88	21	58·8		
				56·2		
				57·5		
				56·4		55·7
				52·7		
				52·5		
Inpahgutt	Kotakoddangul	99	54	55·5		
				44·2		
				50·5		
				50·8		
				46·1		
				45·5		47·12
				47		
				48		
				45		

At Kandakoor hill.

BETWEEN	AND	°	′	″	
Kotapilly	Inpahgutt	67	15	52.4	
				56.5	
				56	
				61.8	
				52.7	55.18
				55	
				54	
				53	
npIahgutt	Kaunkoortee hill	59	34	37.1	
				41	
				37	
				30.3	
				31.5	35.86
				39	
				35	
				36	

At Inpahgutt.

Kotapilly	Kandakoor hill	57	24	21.9	
				21.5	
				14.6	
				12.3	
				18.8	17.09
				20	
				14.2	
				15.8	
				14 7	
Kandakoor hill	Kotakoddanguk	73	6	3.7	
				8.4	
				6	
				3 5	6.77
				9	
				10	
Kandakoor hill	Kaunkoortee hill	32	8	28.7	
				32	
				34 4	
				30.8	
				33.3	30.7
				26 2	
				28 7	
				31.5	
Kotakoddangul	Kandakoor	73	6	6 77	
Kandakoor	Kaunkoortee	32	3	30 7	
Kaunkoortee	Kotakoddangul	41	2	36.07	

At Kotapilly.

BETWEEN		AND						
Inpahgutt	....	Kandakoor	....	°	′	″		
				55	19	45·4		
						49·7		
						56·2		
						55	}	50·91
						50·5		
						53		
						52·5		
						47		

7. PRINCIPAL TRIANGLES.

W. end of the base from the E. end of the base = 30806.24 feet.

Number.	TRIANGLES.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	W. end of the base,	75 33 32.13	—0.16			75 33 31.5	
	E. end of the base,	75 39 24.6	—0.16			74 39 23.5	
24	Malliga hill,	28 47 5 1	—0.1			28 47 5	
		180 0 1.93		0.44	+1.37	180 0 0	
	Malliga hill from	W. end of the base,					619.2.
		E. end of the base,					61955.5

W. end of the base from Malliga hill = 51982.8 feet.

	W. end of the base,	82 38 46.57	—0.18			82 38 46.5	
	Malliga hill,	26 15 29.41	0.11			26 15 29.5	
25	Daumergidda,	7 5 43 4	0.11			71 5 44.0	
		79 59 59.32	0.22	1.04		180 0 0	
	Daumergidda from	W. end of the base,					28985.7
		Malliga hill,					64977.8

Number.	TRIANGLES.	Observed Angles.	Difference.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Daumergidda from Malliga hill = 84977.8 feet.						
	Daumergidda,	° ′ ″ 78 20 25 95	—0.53			° ′ ″ 78 20 24	
	Malliga,	59 49 29 67	—0.39			59 49 28 6	
26	Doodallah,	41 50 8.11	—0.32			41 50 7 4	
		180 0 3 73		1.27	+2 46	180 0 0	
	Doodallah from {Daumergidda, / Malliga hill,						84217.9 / 95408 8
	Malliga hill from Doodallah = 95408.8 feet.						
	Malliga,	74 20 57.55	—0.36			74 20 54.	
	Doodallah,	28 35 43.56	—0 27			28 35 42 3	
27	Sheelapilly,	77 3 25.72	—0 39			77 3 23 7	
		180 0 6.83		1 02	+5.81	180 0 0	
	Sheelapilly from {Malliga, / Doodallah,						46854 7 / 94266.1
	Doodallah from Daumergidda = 84217.9 feet.						
	Doodallah,	70 25 51.67	—0.66			70 25 51.	
	Daumergidda,	59 20 44.91	—0.58			59 20 42 9	
28	Sheelapilly,	50 13 26.68	—0.54			50 34 26.1	
		180 0 3.26		1.78	+1.48	180 0 0.	
	Sheelapilly from {Doodallah, / Daumergidda,						94266 9 / 103250.6
	Doodallah from Sheelapilly = 94266.9						
	Doodallah,	42 40 31 53	—0.14			42 40 31.3	
	Sheelapilly,	73 49 6.42	—0 59			73 49 6.	
29	Goreagutt hill,	63 30 22 12	—0.50			63 30 22.7	
		180 0 0.14		1 53	—1.39	180 0 0.	
	Goreagutt from {Doodallah, / Sheelapilly,						101153.9 / 71395.7

Numbers.	TRIANGLES.	Observed Angles.	Differences.	Subtractive Excess.	Error.	Angles for Calculation.	Distances in Feet.
	Doodallah,	° ′ ″ 83 49 20.63	—0.56			° ′ ″ 83 49 20 1	
	Sheelapilly,					32 35 16.3	
30	Taudmunnoor,	63 35 23 96	—0.37			63 35 23 6	
						180 0 0	
	Taudmunnoor from	{Doodallah,					54687 5
		{Sheelapilly,					104641 1
	Sheelapilly from Taudmunnoor = 104640.4.						
	Sheelanilly,					41 13 49	
	Taudmunnoor,	42 43 52.	—0 26			42 43 51.7	
31	Goraegutt,	96 2 20 02	—0 65			96 2 19 3	
						180 0 0	
	Goraegutt from	{Sheelapilly,					71400 5
		{Taudmunnoor,					99351 7
	Sheelapilly from Goraegutt 71398.1 feet.						
	Sheelapilly,	29 59 28 86	—0.11			29 59 27.5	
	Goraegutt,	111 15 22.4.	—0 71			111 15 20.5	
32	Kotamarpilly,	38 45 12.1	—0.08			38 45 12	
		180 0 3.36		0 90	+2 46	180 0 0	
	Kotamarpilly from	{Sheelapilly,					106300.9
		{Goraegutt,					57014.5
	Doodallah from Goraegutt 101154.9 feet.						
	Doodallah,	31 23 24.1	—0.12			31 23 24	
	Goraegutt,	116 5 21.02	—1 89			116 5 19.2.	
33	Topecondah,	32 31 17.33	—0.10			32 31 16.8.	
		180 0 2 51		2.11	+0.40	180 0 0.	
	Topecondah from	{Doodallah,					169995 2
		{Goraegutt,					980 2.7

Numbers.	TRIANGLES.	Observed Angles.	Difference.	Sum of Excess.	Error.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	Doodallah,	41 8 49 1	−0.12			41 8 48	
	Goraegutt,	32 31 57 83	−0.15			32 31 57.	
34	Taudmunnoor,	106 19 15 96	−0.63			106 19 15.	
		180 0 2.89		0.9	+1.99	180 0 0.	
	Taudmunnoor from { Doodallah,						56683.
	Taudmunnoor from { Goraegutt,						69353.5

Goraegutt from Taudmunnoor=69353.5

	Goraegutt,	83 33 23 25	−0.71			83 33 22 6	
	Taudmunnoor,	59 4 11 7	−0.46			59 4 11.4	
35	Topecondah,	37 22 26.36	−0.43			37 22 26 0	
		180 0 1.31		1.60	−0.29	180 0 0.	
	Topecondah from { Goraegutt,						98004.9
	Topecondah from { Taudmunnoor,						113530.4

Goraegutt from Topecondah=98003.8 feet.

	Goraegutt,	69 8 57.09	−0.42			69 8 56.6	
	Topecondah,	34 25 59.77	−0.34			34 25 59	
36	Kotamarpilly,	76 25 4.87	−0.48			76 25 4.4	
		180 0 1.73		1.24	+0.79	180 0 0	
	Kotamarpilly from { Goraegutt,						57009.9
	Kotamarpilly from { Topecondah,						94220.5

Goraegutt from Kotamarpilly=57009.9 feet.

	Goraegutt,	111 15 22. 4	−0.71			111 5 2[illegible] 5	
	Kotamarpilly,	38 45 12 1	−0.08			38 45 12	
37	Sheelapilly,	29 59 22.86	−0.11			29 59 27 5	
		180 0 3.36		0.90	+2.46	180 0 0	
	Sheelapilly from { Goraegutt,						71392.3
	Sheelapilly from { Kotamarpilly,						106292.2

Kotamarpilly from Topecondah = 94220.5 feet.

Number.	TRIANGLES.	Observed Angles.	Differences.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	Kotamarpilly,	78 4 33.83	−0.05	4		78 4 33.2	
	Topecondah,	43 34 52.92	−0.46			41 34 52.5	
38	Annan agherry,					60 20 34.3	
						180 0 0	
	Annantagherry from { Kotamarpilly, Topecondah,						74745.4 / 105237.8

Kotamarpilly from Annantagherry = 74745.4 feet.

	Kotamarpilly,	37 3 36.37	−0.03			37 3 35.7	
	Annantagherry,	115 40 32.67	−1.41			115 40 31.0	
39	Kotakoddangul,	27 15 53.85	−0.59			27 15 53.4	
		180 0 2.89		1.57	+1.32	180 0 0	
	Kotakoddangul from { Kotamarpilly, Annantagherry,						147052.6 / 98329.9

Kotamarpilly from Kotakoddangul = 147052.6 feet.

	Kotamarpilly,	131 41 30.81	−4.23			131 4 26.6	
	Kotakoddangul,					20 1 41.6	
40	Sheelapilly,					28 16 51.8	
						180 0 0	
	Sheelapilly from { Kotamarpilly, Kotakoddangul,						106296.55 / 231767.9

In order to obtain the distance from *Sheelapilly* to *Kotakoddangul*, for the purpose of reducing the terrestrial arc, being more conveniently situated with respect to the meridian of *Dolagoontah*; the internal chord angle at *Kotamarpilly* with the included sides *Sheelapilly* from *Kotamarpilly*; and *Kotamarpilly* from *Kotakoddangul* have been used. Hence (as in the above triangle,) the side *Sheelapilly* to *Kotakoddangul* = 231767.9 feet, and the angles at *Sheelapilly* and *Kotakoddangul* corrected as observed angles will be 28 16 50.8, and 20 1 41.1.

Annantegherry from Kotakoddangul=98329.9 feet.

Number.	TRIANGLES.	Observed Angles.	Differences.	Spherical Excess.	Error.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′ ″	
	Annantagherry,	76 9 50.58	−0.32			76 9 50	
	Kotakoddangul,	23 39 56.87	−0 23			23 39 56 5	
41	Purgy hill,	80 10 13.94	−0.36			80 10 13.5	
		180 0 1 39		0 91	+0 48	180 0 0	
	Purgy hill from {Annantagherry, Kotakoddangul,						40057 6 / 56899 2

Kotakoddangul from Purgy hill=96899.2 feet.

	Kotakoddangul,	47 58 27.39	−0.59			47 58 26.1	
	Purgy hill,	79 55 11.41	−0 88			79 55 9.6	
42	Pochamagutt,	52 6 25 4	−0 60			52 6 25.1	
		180 0 4.2		2 07	+2.13	180 0 0.	
	Pochamagut from {Kotakoddangul, Purgy hill,						120892 9 / 91212.2

Kotakoddangul from Pochamagutt=120892.9

	Kotakoddangul,	57 0 56.2	−1.16			57 0 55.	
	Pochamagutt,	73 57 5.3	−1.44			73 57 4.	
43	Inpahgutt,	. . .				49 2 1.	
						180 0 0.	
	Inpahgutt from {Kotakoddangul, Pochamagutt,						153863.3 / 134297.0

Kotakoddangul from Inpahgut =153863.3

	Kotakoddangul,	39 2 39 4	−0.47			39 2 39.	
	Inpahgutt,	41 2 36 07	−0.46			41 2 35.5	
44	Kaunkoortee,	99 54 47.12	−1.43			99 54 45.5	
		180 0 2.59		2 36	+0.23	180 0 0	
	Kaunkoortee from {Kotakoddangul, Inpahgutt,						102562 / 93390.2

Kaunkoortee from Inpahgutt = 98390 2 feet.

Number.	TRIANGLES.	Observed Angles.	Differences.	Spherical Excess.	Errors.	Angles for Calculation.	Distances in Feet.
		° ′ ″				° ′	
	Kaunkoortee,	88 21 55 7	—0.68			88 21 54.7	
	Inpahgutt,	32 3 30 7	—0.30			32 3 30.1	
45	Kandakoor hill,	59 34 35.86	—0.37			59 34 35.2	
		180 0 2.26		1.41	+0.85	180 0 0	
	Kandakoor from { Kaunkoortee,						60868
	Kandakoor from { Inpahgutt,						114054,9

Inpahgutt from Kandakoor = 114054.9 feet.

	Inpahgutt,	57 24 17 09	—0 94			57 24 16.	
	Kandakoor,	67 15 55.18	—1.05			67 15 54.	
46	Kotapilly,	55 19 50 91	—0 93			55 19 50.	
		180 0 3.18		2 92	+0.26	180 0 0.	
	Kotapilly from { Inpahgutt,						127902.5
	Kotapilly from { Kandakoor,						116835.0

Inpahgutt from Kotapilly = 127902 5 feet.

	Inpahgutt,	48 32 13.04	—1.08			48 32 12	
	Kotapilly hill,	84 48 40.7	—1.84			84 48 38.8	
17	Darroor hill,	46 39 10.28	—1.07			46 39 9.2	
		180 0 4.02		3.99	+0.03	180 0 0	
	Darroor hill from { Inpahgutt,						175161.6
	Darroor hill from { Kotapilly,						131802.7

8. DESCRIPTION OF THE GREAT STATIONS.

Baſe Line.—The weſt end is on a high ground near *Beder* about ten miles north, and three and a half miles north weſt by weſt from *Kaveramoongy* nearly. The ſtation is on the highest part of the ground marked by a platform built of ſtone and chunam, level with the ſurface of the ground, having a large ſtone in the center marked with a circle. There are ſeveral villages around this ſtation, as *Shicarkanah* to the ſouth weſt about two miles; *Oudootpoor* one and a quarter miles weſt, and *Yaſhigy* about one and a half miles weſt northweſt.

The eaſt end is at the north eaſt angle of a field on the northern declivity of the high ground lying between the villages of *Daumergidda* and *Naugulgidda* both which are ſituated on the great road leading from *Moorung* to *Hydrabad* by way of *Jogypett*. The ſtation is marked by a platform of ſtone and chunam raiſed three feet above the ground, in the center of which is a ſtone with a circle.

Daumergidda ſtation. The grand ſtation of obſervation in latitude 18° 3′ 23.6 is on a conſpicuous high ground about one mile north eaſt from the village of *Daumergidda*, and about eight miles weſt from *Narainkadda*. The ſtation is on the ſummit of the high black cotton ground, a few feet weſt of the road leading from *Chillerigy* to *Angherrigy*, and is marked by a ſtone platform level with the ground having a ſtone at the foundation marked with a circle and correſponding with the mark on the ſtone above.

Malliga hill. The moſt conſpicuous hill of a range ſeemingly connected with the *Beder* heights, about ſix miles eaſt from *Beder*, and about one mile ſouth eaſt of *Malliga*, a ſmall village from which the hill derives its name. The ſtation is marked on the gravel rock and a ſtone with a circle laid over it, ſurrounded with a pile of ſtones ſupporting a ſmall tree.

Doodallah ſtation is on an extenſive range of high grounds in a direction eaſt and weſt, and is about two and a half miles north eaſt of *Gejwadda*, and about one mile north of *Doodallah*. The ſtation is marked by a ſtone and circle on a platform.

Note. The great tree on the high ground about three-quarters of a mile from the ſtation, being in the way of the flag at *Malliga*, a branch of the tree was cleared off in order to obſerve the flag on the left ſide of it.

Sheelapilly ſtation is on a conſpicuous pob or mound of earth riſing about 60 feet above the plain on which it ſtands, its baſe not ſenſibly differing from a circle whoſe diameter may be 200 feet nearly; this ſtation is about 4 miles weſt of *Sungum* and 2½ miles ſouth of *Moongy*, both places being on the road from *Beder* to *Hydrabad*. A circle inſcribed on a ſtone in the center of a circular platform of clay about 10 feet high, raiſed on the nob with a marked ſtone at the foundation, defines the ſtation.

Taudmunnoor ſtation, is on a high ground about 7 miles weſt from *Joggpett*, ſituated between *Royepaud* and *Taudmunnoor*. The ſtation is defined by a circle inſerted on a ſtone.

Goraegutt hill. This is a low brown hill taking its name from a very ſmall village at the ſouth eaſt foot, lying about 1¼ mile weſt of *Goplaveram*, a low fortified hill, and about 4 miles ſouth weſt of *Moonpilly*, a village of ſome note on the great road from *Hydrabad* to *Beder*. The ſtation is marked by a ſtone and circle on the ſummit about 60 feet north eaſt of a ſtone pillar.

Topecondah. This is about 12 miles eaſt of *Mominpett*, and about 3 miles weſt of *Dobeepett*, a large village in the road from *Mominpett* to *Hydrabad*, and the village which gives the name to the ſtation, is at the eaſt foot of a low hill and pagoda lying about one mile eaſt of the ſtation. A ſtone with a circle on the ſummit defines the ſtation.

Kotamarpilly. This ſtation is on the ſouth extremity of a low gravel ridge about 2 miles eaſt ſouth eaſt of *Pedda Marpilly*, about ¼ of a mile from *Kotamarpilly*, and about 10 miles weſt of *Mominpett*, a place of conſiderable note. The ſtation is marked on the gravel rock about 200 feet ſouth eaſt of a remarkable *Banian* tree.

Annan[illegible] hill. This is a flat hill covered with thick jungle, ſituated

T[illegible]

about 11 miles north of *Purgy*, and about 8 miles east of *Dorade*. The ſtation is about one mile ſouth weſt of the Pagoda, on a platform marked by a ſtone with a circle.

Kotakoddangu' ſtation, on a high ground about 1¼ mile north by eaſt of the large village of *Kotakoddangul*, and about half a mile north weſt of a remarkable tree on the ſame ground. The ſtation is marked by a ſtone and circle in the middle of a platform.

Purgy hill. The ſouthernmoſt of a maſs of hills covered with much jungle, ſituated about 3 miles north eaſt of *Purgy*.—Near the weſt foot of the hill is a ſmall village, *Mülla Boyengoodum*. The jungle on the hill has been cleared and a platform raiſed, in the middle of which is a ſtone with a circle marking the ſtation.

Pochamagutt. This is a low hill though the higheſt in that neighbourhood. It is ſurrounded to a great extent with much jungle, and derives its name from a place of worſhip in the vicinity, and is about one mile eaſt from *Cooſmäſundrum*. The jungle has been cleared from the top, and a ſtone with a circle ſunk on the ſummit denotes the ſtation.

Kaunkoortee hill. A flat hill on the Table land, about 6 miles north eaſt of *Goondamettakul*, a very extenſive place, and about 1¼ mile north of *Kaunkoortee*.—The ſtation is marked by a circle on a ſtone fixed on the top of the hill, and near the weſt brink.—*Annageondy*, a well known hill, having two very remarkable trees on the ſummit, is about one mile weſt of the ſtation.

Kundkoor. A low hill below the Table land about 10 miles weſt of *Naranapettah*, about ſix miles ſouth weſt of *Goondamettakul*, and 1½ mile ſouth eaſt of *Chintelpilly*: the village from which the hill derives its name, is at the ſouth foot. The ſtation is marked by a ſtone and circle ſunk on the ſummit of the hill.

9. REDUCTION OF THE SIDES OF THE MERIDIONAL TRIANGLES TO THE MERIDIAN OF DODAGOONTAH FOR DETERMINING THE LENGTH OF THE TERRESTRIAL ARC.

The length of the Arc comprehended by the parallels of Dodagoontah station, and the stations at Namthabad and Daumergidda.

Stations at	Names of Places.	Bearings referred to the Meridian of Dodagoontah Station.	Distance.	Distances on the		Distances from Dodagoontah on the	
				Perpendicular.	Meridian.	Perpendicular.	Meridian.
		° ′ ″	FEET.	FEET.	FEET.	FEET.	FEET.
Yerracondah,	Ooracondah,	7 4 21·5 N.W	126785.7	15810.8 W.	125821.0 N.	6244 9 W.	468488 7 N.
Ooracondah,	Davurcondah,	5 32 52.1 N. E.	130506.1	14550.4 E.	149801.1 N.	8305.5 E.	608289.8 N.
Davurcondah,	Goolydroog,	0 16 40.6 N. E.	138946.2	771.1 E.	158944.3 N.	9076.6 E.	767234.1 N.
Gootydroog,	Namthabad,	70 43 30.6 S. W.	16473.2	15548.2 W.	5437.5 S.	6472.3 W.	761796.6 N
	Koelacondah,	10 59 34.9 N.W.	76750.9	14635.6 W.	75342.5 N.	5559 W.	842576.6 N.
Koelacondah,	Poolycondah,	4 6 33.9 N.W.	34084.1	3875.7 W.	33945 N.	9434.7 W.	896521 6 N.
Poolycondah,	Kerra Bellagul,	13 21 56.9 N. E.	127940.1	29570 2 E.	124455.3 N.	20136 2 E.	1020976 9 N.
Kerra Bellagul,	Darrboor Hill,	3 4 35.9 N.W.	150701.3	8088 4 W.	150484.1 N.	12047.8 E.	1171461 N.
Darroor Hill,	Tupahgutt,	0 45 15.7 N.W	175159.1	2306.1 W.	175144 N.	9741.7 E.	1346605 N.
Tupahgutt,	Kotekoddangul,	1 42 38.8 N.W	53863.3	4593.5 W.	153794.7 N.	5148.2 E.	1500399.7 N
Kotakoddangul,	Sheelapilly,	2 20 25.7 N. E	231767.9	9464.9 E.	231574.5 N.	14613.1 E.	1731974 2 N.
Sheelapilly,	Daumergidda Hill,	0 1 33. N. E.	103250.6	46.6 E.	103250.6 N.	14659.7 E.	1835224.8 N.

The terestrial arc between *Dodagoontah* and *Namthabad* station as in the foregoing table is 761796.6

And the terestrial arc between *Dodagoontah* and *Putchapollam* (see A. R Vol. 12,) is 727334 6

The sum will be the terestrial arc between *Putchapollam* and *Namthabad* equal 1489131.2

To which add the terestrial arc between *Putchapollam* and *Punnae* station (see A. R. Vol. 12,) 1029100 5

We have for the terestrial arc between *Punnae* and *Namthabad station* 2518231.7

The terestrial arc between *Dodagoontah* and *Daumergidda* as in the preceeding table is 1835224 8

And the terestrial arc between *Dodagoontah* and *Namthabad* equal 761796 6

The difference will be the terestrial arc between *Namthabad* and *Daumergidda*. 1073428 2

To which add the terestrial arc between *Punnae* and *Nanthabad* as above 2518231.7

The sum will be the terestrial arc between *Daumergidda* and *Punnae* station. 3591659 9

10. Zenith distances of Stars observed at *Punnae*, *Namthabad*, and *Daumergidda* stations, with their corrections for precession, nutation, aberration, and the semi-annual solar equation, back to the beginning of the year 1805.

OBSERVATIONS AT PUNNAE STATION.

LEONIS.

Nearest point on the Limb, 2° 35′ *N.*

1869. Month.	Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			+			
		° ′ ″	″	° ′ ″	°	°
April 12	E.	2 35 25.13	1 19.970	2 36 45.100	84	84
13	W.	2 35 36.63	1 19.931	2 36 56.561	84	83
14	E.	2 35 23.63	1 19.890	2 36 43.520	85	84
16	W.	2 35 34.13	1 19.798	2 36 53.928	85	84
17	E.	2 35 23.88	1 19.755	2 36 43.635	84	83
18	W.	2 35 34.5	1 19.710	2 36 54.210	84	83
19	E.	2 35 23.5	1 19.661	2 36 43.161	84	84
20	W.	2 35 34.5	1 19.616	2 36 54.116	84	84
23	E.	2 35 23 25	1 19.480	2 36 42.730	83	83
24	W.	2 35 35.38	1 19.427	2 36 54.807	83	83
25	E.	2 35 24.5	1 19.376	2 36 43.876	84	84
26	W.	2 35 35.75	1 19.324	2 36 55.074	85	85
27	E.	2 35 24.25	1 19.273	2 36 43.523	85	86
28	W.	2 35 36.88	1 19 221	2 36 56.101	86	87
29	E.	2 35 23.63	1 19.169	2 36 42.799	84	85
30	W.	2 35 36.63	1 19.117	2 36 55.747	87	87
May 2	E.	2 35 23 38	1 19.036	2 36 42.406	84	84
3	W.	2 35 38.	1 18.972	2 36 56.972	82	82
5	E.	2 35 25.5	1 18.865	2 36 44.365	84	84
6	W.	2 35 34.78	1 18.820	2 36 53.570	84	84
7	E.	2 35 25.88	1 18.766	2 36 44.646	84	84
				Mean	84.14	84.24

REGULUS.

Nearest point on the Limb, 4° 45′ *N.*

1809. Month.	Face.	Observed Zenith Distance.	Corrections.	Correct Zenith Distance.	Thermometers. Upper.	Lower.
		° ′ ″	+ ″	° ′ ″	°	°
April 12	E.	4 43 51 87.	1 24.410	4 45 16.280	84	84
13	W.	4 44 2	1 24.359	4 45 26.359	84	83
14	E.	4 43 49.87	1 24 311	4 45 14.181	83	82
16	W.	4 43 59 37	1 24.311	4 45 23.581	85	84
17	E.	4 43 49 87	1 24.117	4 45 14 017	84	83
18	W.	4 44 2	1 24 093	4 45 26.093	85	22
20	E.	4 43 49	1 23.976	4 45 12.976	83	83
24	W.	4 43 59 5	1 23.735	4 45 23 235	82	83
25	E.	4 43 51 12	1 23.679	4 45 14.799	82	83
26	W.	4 44 0.5	1 23.617	4 45 24.117	82	83
27	E.	4 43 48 87	1 23 546	4 45 12.416	84	84
28	W.	4 44 0.37	1 23.485	4 45 23 855	84	85
29	E.	4 43 48.37	1 23 428	4 45 11.798	83	84
30	W.	4 44 1.62	1 23 361	4 45 24.981	85	85
May 2	E.	4 43 48 87	1 23.249	4 45 12 119	83	83
3	W.	4 44 2.87	1 23.188	4 45 26.058	82	82
5	E.	4 43 49.12	1 23 071	4 45 12.191	84	84
6	W.	4 44 1.87	1 23.008	4 45 24 878	83	83
7	E.	4 43 50.87	1 22 947	4 45 13.817	83	83
8	W.	4 44 2.87	1 22.889	4 45 25.759	82	82
				Mean	83.25	83.25

α LEONIS.

Nearest point on the Limb, 8° 20′ *N.*

			+			
April 17	E.	8 18 17 37	1 31.934	8 19 49.304	83	82
18	W.	8 18 28 87	1 31.848	8 20 0 718	83	82
19	E.	8 18 20.74	1 31.765	8 19 52.501	83	83
20	W.	8 18 28.87	1 31.674	8 20 0.544	83	83
23	E.	8 18 15 87	1 31 399	8 19 47 269	82	82
24	W.	8 18 28 89	1 31.3 7	8 20 0.197	82	83
25	E.	8 18 15.37	1 31.221	8 19 46.591	82	83
26	W.	8 18 31.87	1 31.127	8 20 2 997	82	83
28	E.	8 18 17 37	1 30.936	8 19 48 306	83	85
29	W.	8 18 26.87	1 30.842	8 19 57.712	83	83
30	E.	8 18 17.39	1 30.749	8 19 48.139	85	85
May 3	W.	8 18 32	1 30.486	8 20 2.486	82	82
4	E.	8 18 18.12	1 30.401	8 19 48.521	82	83
5	W.	8 18 33.24	1 30.315	8 20 3.555	82	83
6	E.	8 18 18.74	1 30.231	8 19 48.971	82	82
7	W.	8 18 31.62	1 30.142	8 20 1.762	82	82
				Mean	82.62	82.87

α LEONIS.

Nearest point on the Limb, 7° 30′ *N.*

1809. Month.		Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			° ′ ″	+ ′ ″	° ′ ″	°	°
April	12	E.	7 28 22.87	1 31.718	7 29 57.588	84	84
	13	W.	7 28 37.37	1 34.631	7 30 12.001	84	83
	14	E.	7 28 25.87	1 34.534	7 30 0.404	83	82
	16	W.	7 28 34.24	1 34 369	7 30 8.609	83	82
	17	E.	7 28 21.37	1 34.279	7 29 55.649	83	82
	18	W.	7 28 32.12	1 34.185	7 30 6.305	83	82
	19	E.	7 28 25.24	1 34.088	7 29 59.328	82	82
	20	W.	7 28 33.62	1 33.986	7 30 7.606	81	81
	23	E.	7 28 25.87	1 33.696	7 29 59.566	84	82
	24	W.	7 28 3 .37	1 33.593	7 30 8 963	82	83
	25	E.	7 28 26.87	1 33 491	7 30 0 364	81	82
	26	W.	7 28 35.87	1 33.39	7 30 9.261	82	83
	28	E.	7 28 25.87	1 33.192	7 29 59.062	84	85
	29	W.	7 28 38.87	1 33.084	7 30 11.954	83	83
	30	E.	7 28 22.87	1 32.978	7 29 55.848	82	82
May	2	W.	7 28 38.97	1 32.788	7 30 11.758	81	82
	4	W.	7 28 37.87	1 32 596	7 30 10.466	83	82
	5	E.	7 28 24.12	1 32.503	7 29 56.623	82	83
	6	W.	7 28 38.87	1 32.400	7 30 11.270	82	82
	7	E.	7 28 25.47	1 32.309	7 29 57.779	82	82
					Mean	82.38	82.48

γ VIRGINIS.

Nearest point on the Limb, 3° 50′ *N.*

				+			
April	18	W.	3 49 36.62	1 31.332	3 51 7.952	82	81
	19	E.	3 49 26	1 31.242	3 50 57.242	82	82
	20	W.	3 49 35	1 31. 52	3 51 6.152	80	81
	23	E.	3 49 26	1 30.845	3 50 56.845	82	82
	25	W.	3 49 35.37	1 30 614	3 51 6 014	81	82
	26	E.	3 49 25 87	1 30 540	3 50 56.410	82	83
	28	W.	3 49 38	1 30.321	3 51 8.321	83	84
	29	E.	3 49 28	1 30 218	3 50 56.218	83	83
	30	W.	3 49 39	1 30.114	3 51 9.114	82	82
May	3	E.	3 49 27 87	1 29.792	3 50 57.661	82	82
	4	W.	3 49 38 25	1 29.688	3 51 7 938	81	82
	5	E.	3 49 26.75	1 29.578	3 50 56 328	82	82
	6	W.	3 49 37.12	1 29.466	3 51 6.586	81	82
	7	E.	3 49 28.6	1 29.356	3 50 57 956	81	81
					Mean	81.71	82.14

3 SERPENTIS.

Nearest point on the Limb, 3° 0′ *N.*

1802. Month.		Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			° ′ ″	+	° ′ ″	°	°
April	18	W.	3 1 30.76	58.269	3 2 29.029	80	79
	19	E.	3 1 20.13	58.164	3 2 18.294	80	80
	20	W.	3 1 29.26	58.058	3 2 27.318	80	80
	23	E.	3 1 20.63	57.702	3 2 18.332	81	81
	24	W.	3 1 29.63	57.576	3 2 27.206	81	81
	25	E.	3 1 20.13	57.445	3 2 17.575	80	80
	26	W.	3 1 29.13	57.317	3 2 26.447	82	82
	27	E.	3 1 20.13	57.189	3 2 17.319	83	83
	28	W.	3 1 32.26	57.056	3 2 29.316	84	84
	29	E.	3 1 20.13	56.921	3 2 17 051	83	83
	30	W.	3 1 32.51	56.792	3 2 29.302	83	83
May	3	E.	3 1 19 13	56.376	3 2 15 506	80	80
	5	W.	3 1 32.38	56.096	3 2 28.476	81	82
	6	E.	3 1 20.63	55 949	3 2 16 579	81	81
	7	W.	3 1 32.63	55 804	3 2 28.434	81	81
					Mean	81.33	81.33

γ SERPENTIS.

Nearest point on the Limb, 8° 5′ *N.*

					+			
April	18	W.	8 7 52.26	51 755	8 8 44 015	80	79
	19	E.	8 7 42.39	51.623	8 8 34.013	80	80
	20	W.	8 7 52.14	51 482	8 8 43 622	80	80
	23	E.	8 7 40.51	51.045	8 8 31.555	81	81
	24	W.	8 7 52.89	50.891	8 8 43.781	81	81
	25	E.	8 7 42.26	50 749	8 8 33.009	80	80
	26	W.	8 7 66 39	50.587	8 8 46.977	82	82
	27	E.	8 7 43 64	50.427	8 8 34.067	83	83
	28	W.	8 7 56.89	50.270	8 8 46.160	84	84
	29	E.	8 7 42.39	50.108	8 8 32.498	83	83
	30	W.	8 7 56 64	49.944	8 8 46.584	83	83
May	3	E.	8 7 44.14	49 443	8 8 33.583	80	80
	6	W.	8 7 56.89	48.938	8 8 45 828	81	81
	7	E.	8 7 46.26	48.756	8 8 35.026	81	81
					Mean	81 36	81.29

OBSERVATIONS AT NAMTHABAD STATION.

LEONIS.

Nearest point on the Limb, 4 20 S.

1811. Month.	Face.	Observed Zenith Distance.	Corrections	Correct Zenith distance.	Thermometers. Upper.	Lower.
		° ′ ″	° ′ ″	° ′ ″	°	°
April 18	W.	4 21 9 13	1 48 961	4 19 20.169	86	86
20	E.	4 21 19 53	1 48 857	4 19 30.673	83	83
21	W.	4 21 10.38	1 48.807	4 19 21.573	84	84
22	E.	4 21 18 26	1 48.761	4 19 29.499	87	87
24	W.	4 21 8 63	1 48.656	4 19 19.974	91	91
25	E.	4 21 20.13	1 48 599	4 19 31.531	92	92
26	W.	4 21 9 63	1 48.542	4 19 21.088	94	93
27	E.	4 21 19 13	1 48.488	4 19 30.642	96	95
28	W.	4 21 9.63	1 48.431	4 19 21.199	94	94
29	E.	4 21 19.26	1 48.377	4 19 30.883	93	93
30	W.	4 21 9.63	1 48 318	4 19 21.312	92	92
May 2	E.	4 21 19.38	1 48.221	4 19 31.159	78	79
				Mean	89.2	89.2

REGULUS.

Nearest point on the Limb, 2 10 S.

April 18	W.	2 12 47.51	1 55.373	2 40 52.137	86	86
20	E.	2 12 58.89	1 55.954	2 11 3.636	84	84
21	W.	2 12 45.76	1 55.189	2 10 50 571	83	83
22	E.	2 12 59.89	1 55.124	2 11 4.766	86	86
23	W.	2 12 44.76	1 55.057	2 10 49.703	83	83
24	E.	2 12 58.89	1 54.992	2 11 3.898	91	91
25	W.	2 12 44.87	1 54.932	2 10 49.938	91	91
26	E.	2 12 58.24	1 54.871	2 11 3.369	93	92
27	W.	2 12 44.74	1 54.801	2 10 49.939	95	94
28	E.	2 12 58.87	1 54.730	2 11 4.140	94	94
29	W.	2 12 46.87	1 54.667	2 10 52.203	93	93
30	E.	2 12 57.62	1 54.603	2 11 3.017	92	92
				Mean	89.3	89 1

γ LEONIS.

Nearest point on the Limb, 5° 40′ *N.*

1811, Month.	Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
		° ′ ″	+ ° ′	° ′ ″	°	°
April 18	W.	5 41 33.13	1 56.018	5 43 29.148	84	84
20	E.	5 41 22.63	1 55.837	5 43 18.467	84	84
21	W.	5 41 33.63	1 55.754	5 43 29.384	84	84
22	E.	5 41 21.13	1 55.673	5 43 16.803	86	86
23	W.	5 41 34.56	1 55.586	5 43 30.146	84	83
24	E.	5 41 20.38	1 56.497	5 43 15.877	90	90
25	W.	5 41 35.13	1 55.411	5 43 30.541	91	91
26	E.	5 41 21.19	1 55.329	5 43 16.459	93	92
27	W.	5 41 33.13	1 55.241	5 43 28.371	95	94
28	E.	5 41 22.26	1 55.149	5 43 17.409	94	94
29	W.	5 41 32.88	1 55.064	5 43 27.944	92	92
30	E.	5 41 22.13	1 54.980	5 43 17.110	92	92
				Mean	89.1	88.8

ϱ LEONIS.

Nearest point on the Limb, 1° 20′ *N.*

			+			
April 20	E.	1 21 29.26	2 6.534	1 23 35.794	80	80
21	W.	1 21 40.26	2 6.441	1 23 46.701	82	82
22	E.	1 21 28.13	2 6.348	1 23 34.478	85	85
23	W.	1 21 40.13	2 6.256	1 23 46.386	82	81
24	E.	1 21 28.28	2 6.156	1 23 34.436	89	89
25	W.	1 21 43.13	2 6.067	1 23 49.197	88	88
26	E.	1 21 30.13	2 5.979	1 23 36.109	91	91
27	W.	1 21 40.13	2 5.873	1 23 46.003	93	93
28	E.	1 21 29.63	2 5.779	1 23 35.409	93	91
29	W.	1 21 40.51	2 5.684	1 23 46.194	90	90
30	E.	1 21 29. 3.	2 5.588	1 23 34.718	90	90
May 4	W.	1 21 38.75	2 5.230	1 23 43.990	90	90
				Mean	87.85	87 7

β LEONIS.

Nearest point on the Limb, 0° 39′ *N.*

1811. Month.		Face.	Observed. Zenith distance.	Corrections.	Correct'd Zenith distance.	Thermometers. Upper.	Lower
			° ′ ″	+ ′ ″	° ′ ″	°	°
April	18	W.	0 31 42.13	2 9.922	0 33 52.052	80	86
	20	E.	0 31 33.76	2 9.724	0 33 43.484	79	79
	21	W.	0 31 45 51	2 9 625	0 33 55.155	89	81
	22	E.	0 31 33.63	2 9 522	0 33 43.152	84	84
	23	W.	0 31 47 26	2 9 428	0 33 56 688	84	81
	24	E.	0 31 31.38	2 9.328	0 33 40 708	87	87
	26	W.	0 31 46.01	2 9.225	0 33 55.235	88	88
	26	E.	0 31 33.03	2 9 120	0 33 42.150	90	90
	27	W.	0 31 46.26	2 9.023	0 33 55.283	92	92
	28	E.	0 31 35.13	2 8.921	0 33 44.051	92	92
	29	W.	0 31 46.51	2 8.813	0 33 55.323	90	90
	30	E.	0 31 33.13	2 8.701	0 33 41.831	90	90
					Mean	86.8	86.7

VIRGINIS.

Nearest point on the Limb, 3° 5′ *S.*

April	25	W.	3 7 9.13	+ 2 5.010	3 5 4 120	87	86
	26	E.	3 7 23 39	2 4.905	3 5 18.485	90	90
	27	W.	3 7 12.13	2 4.802	3 5 7.328	90	90
	29	E.	3 7 20.26	2 4 583	3 5 15 677	88	88
	30	W.	3 7 13.01	2 4.479	3 5 8 531	88	88
May	3	E.	3 7 20.76	2 4.165	3 5 16.595	82	82
					Mean	87.5	87.33

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BOOTIS.

Nearest point on the Limb, 4° 15′ *N.*

1814. Month.		Face	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			° ′ ″	+ ′ ″	° ′ ″	°	°
May	2	W.	4 15 2.00	1 52.448	4 16 54.448	78	76
	3	E.	4 14 52.87	1 52.292	4 16 45.162	81	81
	4	W.	4 15 2.25	1 52.134	4 16 54.384	80	80
	5	E.	4 14 52.87	1 51.979	4 16 44.849	85	84
	7	W.	4 15 4.00	1 52.652	4 16 56.652	84	84
	8	E.	4 14 53.87	1 51.512	4 16 45.382	88	88
	9	W.	4 15 4.50	1 51.357	4 16 55.857	87	87
	12	E.	4 14 55.12	1 50.881	4 16 46.001	88	88
					Mean	83.88	83.75

ARCTURUS.

Nearest point on the Limb, 5° 5′ *N.*

						+					
May	1	E.	5	4	0	1	57.349	5	5	6.349	82	82
	2	W.	5	4	21	1	57.194	5	5	18.194	77	77
	3	E.	5	4	10.37	1	57 045	5	5	7.416	81	81
	4	W.	5	4	20	1	56.885	5	5	16.885	79	79
	5	E.	5	4	10	1	56.721	5	5	6 721	84	84
	6	W.	5	4	20.12	1	56.559	5	5	16.679	84	84
	7	E.	5	4	9.87	1	56 398	5	5	6.268	84	84
	8	W.	5	4	21	1	56.237	5	5	17.237	87	87
	9	E.	5	4	9 87	1	56.076	5	5	5.946	89	88
	15	W.	5	4	19.87	1	55.087	5	5	14.957	84	84
										Mean	83.1	83.0

β BOOTIS.

Nearest point on the Limb, ° ′ 35 *S.*

1811. Month.	Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
		° ′ ″		° ′ ″	°	°
May 2	E.	0 33 17 87	+ 13.719	0 31 39.158	81	81
4	W.	0 33 19 74	+ 38.574	0 31 41.166	79	79
5	E.	0 33 20 24	+ 38.826	0 31 41.814	81	84
7	W.	0 33 17 74	+ 38.140	0 31 39.600	84	84
8	E.	0 33 17 89	+ 37.991	0 31 39.899	87	87
15	W.	0 33 16 19	+ 36.949	0 31 39.541	84	84
				Mean	83.17	83.17

δ SERPENTIS.

Nearest point on the Limb, ° ′ 3 55 *S.*

May 1	E.	3 55 15.13	+ 17.866	3 53 57.264	81	81
3	W.	3 55 6 5	+ 17.598	3 53 48.902	81	81
4	E.	3 55 14.0	+ 17.486	3 53 56.644	79	79
5	W.	3 55 4	+ 17.391	3 53 46.679	81	81
7	E.	3 55 15.13	+ 17.013	3 53 58.087	84	84
9	W.	3 55 4.75	+ 16.761	3 53 47.989	86	86
15	E.	3 55 14.63	+ 16.869	3 53 57.731	86	86
				Mean	82.13	82.13

β SERPENTIS.

Nearest point on the Limb, ° ′ 0 55 *N.*

May 1	E.	0 55 14 5	+ 12.785	0 56 27.285	81	81
3	W.	0 55 22.63	+ 12.467	0 56 35.097	81	81
4	E	0 55 16	+ 12.307	0 56 28 307	78	78
5	W.	0 55 24.5	+ 12.148	0 56 36.648	81	81
7	E.	0 55 15.13	+ 11.817	0 56 26 947	84	84
8	W.	0 55 25.25	+ 11.658	0 56 36.908	86	86
9	E.	0 55 15.33	+ 11.484	0 56 26.814	86	86
15	W.	0 55 25.5	+ 10.452	0 56 35.952	84	84
				Mean	80 13	80.13

SERPENTIS.

Nearest point on the Limb, 1° 7′ 10″ *N.*

1811. Month.		Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			° ′ ″	+ ′ ″	° ′ ″	°	°
May	1	E.	1 11 10.63	1 8.156	1 12 18.786	81	81
	3	W.	1 11 17.51	1 7.832	1 12 25.342	81	81
	4	E.	1 11 11.88	1 7.669	1 12 19.549	78	78
	5	W.	1 11 19.76	1 7.505	1 12 27.266	81	81
	7	E.	1 11 10.38	1 7.174	1 12 17.554	84	84
	8	W.	1 11 21.01	1 7.011	1 12 28.021	86	86
	9	E.	1 11 10.63	1 6.837	1 12 17.467	86	86
	15	W.	1 11 21.13	1 5.786	1 12 26.916	84	84
					Mean	80.13	80.13

HERCULIS.

Nearest point on the Limb, 4° 30′ *N.*

				+			
May	1	E.	4 30 13 13	56 135	4 31 9.265	81	81
	2	W.	4 30 23.5	55.968	4 31 19.468	77	77
	3	E.	4 30 14.5	55.787	4 31 10.287	81	81
	4	W.	4 30 23.75	55.609	4 31 19.359	78	78
	5	E.	4 30 13.5	55.434	4 31 8.934	82	82
	7	W.	4 30 25.13	55.056	4 31 20.186	84	84
	8	E.	4 30 14 0	54.872	4 31 8.872	86	86
	9	W.	4 30 26.0	54.864	4 31 20.684	85	85
					Mean	81.88	81.75

OBSERVATIONS AT DAUMERGIDDA.

LEONIS.

Nearest point on the Limb, 7° 20′ S.

1815. Month.	Face.	Observed Zenith Distance.	Corrections.	Correct Zenith Distance.	Thermometers. Upper.	Lower
		° ′ ″	″	° ′ ″	°	°
February 14	W.	7 19 23.37	2 43.611	7 16 39.759	64	64
15	E.	7 19 35 5	2 43.640	7 16 51.860	66	66
16	W.	7 19 24.37	2 43.680	7 16 40.690	70	70
17	E.	7 19 38	2 43.711	7 16 54.289	73	73
18	W.	7 19 24 75	2 43.733	7 16 41.017	74	74
19	E.	7 19 38.25	2 43 765	7 16 54.485	73	73
22	W.	7 19 20	2 43.822	7 16 36. 78	73	73
23	E.	7 19 38.2	2 43.836	7 16 54 364	70	70
24	W.	7 19 21.12	2 43.851	7 16 37.269	70	70
25	E.	7 19 38.4	2 43.875	7 16 54.525	68	69
26	W.	7 19 18.87	2 43 889	7 16 34.981	75	76
27	E.	7 19 38.3	2 43.913	7 16 54 397	78	78
28	W.	7 19 20.37	2 43 916	7 16 36.454	74	75
March 1	E.	7 19 37.8	2 43.923	7 16 53.877	76	77
3	W.	7 19 22	2 43 939	7 16 38.061	73	73
4	E.	7 19 39	2 43.943	7 16 55.057	75	75
5	W.	7 19 21.67	2 43.946	7 16 37.724	75	74
				Mean	72.3	72.3

REGULUS.

Nearest point on the Limb, 5° 10′ S.

February 14	W.	5 11 6.63	2 56.105	5 8 10.525	65	65
15	E.	5 11 19 63	2 56.128	5 8 23.502	64	64
16	W.	5 11 8 61	2 56.153	5 8 12.457	70	70
17	E.	5 11 17.38	2 56.181	5 8 21.199	72	72
18	W.	5 11 7.13	2 56.202	5 8 10.928	72	72
19	E.	5 11 18 75	2 56 226	5 8 22.521	73	73
21	W.	5 11 7.13	2 56 242	5 8 10 888	75	75
22	E.	5 11 20.23	2 56.253	5 8 23.977	73	73
24	W.	5 11 20 63	2 56.260	5 8 24.370	68	68
25	E.	5 11 4 43	2 56 265	5 8 8.165	68	69
26	W.	5 11 19.13	2 56 269	5 8 22.861	75	75
27	E.	5 11 5.13	2 56.274	5 8 8.856	78	79
28	W.	5 11 19 0	2 56.279	5 8 22.721	74	74
March 3	E.	5 11 4.91	2 56.281	5 8 8.629	73	73
4	W.	5 11 19 76	2 56.269	5 8 23 491	74	74
5	E.	5 11 4.63	2 56.267	5 8 8.363	74	74
				Mean	71.8	71.9

1 LEONIS.

Nearest point on the Limb, 2° 45′ *N.*

1815. Month.		Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
			° ′ ″	′ ″ +	° ′ ″	°	°
February	14	W.	2 43 5.12	3 1.508	2 46 6.718	66	66
	15	E.	2 42 50.87	3 1.578	2 45 52.448	64	64
	16	W.	2 43 2.62	3 1.559	2 46 4.179	71	70
	17	E.	2 42 53.87	3 1.538	2 45 55.408	72	72
	18	W.	2 43 5.12	3 1.511	2 46 6.631	72	72
	21	E.	2 42 51.74	3 1.411	2 45 53.151	75	75
	22	W.	2 43 4.74	3 1.377	2 46 6.117	73	73
	24	E.	2 42 53.24	3 1.292	2 45 54.532	68	68
	25	W.	2 43 1.54	3 1.261	2 46 2.801	68	69
	26	E.	2 42 50.87	3 1.220	2 45 52.090	75	75
	27	W.	2 43 7.74	3 1.183	2 46 8.923	79	79
	28	E.	2 42 52.54	3 1.136	2 45 53.676	74	74
March	2	W.	2 43 6.24	3 1.043	2 46 7.283	76	77
	3	E.	2 42 53.74	3 0.991	2 45 54.731	73	73
	4	W.	2 43 6.04	3 0.930	2 46 6.970	73	73
	5	E.	2 42 52.74	3 0.877	2 45 53.617	74	75
					Mean	72.06	72.19

2 LEONIS.

Nearest point on the Limb, 1° 35′ *S.*

			° ′ ″	— ′ ″	° ′ ″	°	°
February	14	W.	1 36 51.76	3 19.135	1 33 32.625	65	64
	15	E.	1 37 3.01	3 19.156	1 33 43.854	64	64
	16	W.	1 36 51.01	3 19.181	1 33 31.829	71	70
	17	E.	1 37 4.26	3 19.200	1 33 45.060	71	71
	18	W.	1 36 55.63	3 19.214	1 33 36.416	71	71
	19	E.	1 37 5.13	3 19.227	1 33 45.903	73	72
	22	W.	1 36 53.26	3 19.223	1 33 34.037	70	71
	23	E.	1 37 6.26	3 19.222	1 33 47.038	71	71
	24	W.	1 36 50.26	3 19.208	1 33 31.052	65	65
	25	E.	1 37 7.13	3 19.201	1 33 47.929	68	68
	26	W.	1 36 52.26	3 19.205	1 33 33.055	74	74
	27	E.	1 37 5 26	3 19.201	1 33 46.059	75	75
March	3	W.	1 36 51.23	3 19.132	1 33 32.098	73	73
	4	E.	1 37 5 26	3 19.107	1 33 46.158	73	73
	5	W.	1 36 51.13	3 19.084	1 33 32.046	73	73
					Mean	70.5	70.3

β LEONIS.

Nearest point on the Limb, 2° 25′ *S.*

1815. Month.	Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
		° ′ ″	′ ″	° ′ ″	°	°
February 14	W.	2 26 50.26	3 25.504	2 23 24.756	64	63
15	E.	2 27 4.63	3 25.544	2 23 39.086	63	63
16	W.	2 26 50.38	3 25.578	2 23 24.802	70	70
18	E.	2 27 3.76	3 25.640	2 23 38.120	70	70
19	W.	2 26 51.63	3 25.671	2 23 25.959	72	72
21	E.	2 27 4.13	3 25.702	2 23 38.428	74	74
22	W.	2 26 51.63	3 25.713	2 23 25.917	70	70
23	E.	2 27 7.06	3 25.713	2 23 41.347	68	68
24	W.	2 26 49.63	3 25.710	2 23 23.920	65	65
25	E	2 27 6.00	3 25.726	2 23 40.274	67	67
26	W.	2 26 49.66	3 25.735	2 23 23.925	73	73
27	E.	2 27 4.26	3 25.739	2 23 38.521	75	75
March 3	W.	2 26 48.63	3 25.719	2 23 22.911	74	74
4	E.	2 27 6.76	3 25.706	2 23 41.054	74	74
5	W.	2 26 49.26	3 25.693	2 23 23.567	73	73
				Mean	70.13	70.07

γ VIRGINIS.

Nearest point on the Limb, 6° 5′ *N.*

January 31	W.	6 5 41	3 19.012	6 2 21.988	65	65
February 1	W.	6 5 42.5	3 19.134	6 2 23.366	64	64
3	E.	6 5 56.5	3 19.375	6 2 37.125	64	65
4	W.	6 5 43.5	3 19.498	6 2 24.002	65	66
5	E.	6 5 58.13	3 19.611	6 2 38.519	64	65
6	W.	6 5 43.13	3 19.720	6 2 23.410	59	60
7	E.	6 6 0.63	3 19.831	6 2 40.799	58	59
8	W.	6 5 39.5	3 19.945	6 2 19.555	58	58
9	E.	6 5 58.63	3 20.044	6 2 38.586	62	62
11	W.	6 5 57.63	3 20.218	6 2 37.412	67	66
13	W.	6 5 44.13	3 20.394	6 2 23.736	63	63
14	E.	6 5 59 13	3 20.477	6 2 38.653	61	61
15	W.	6 5 43.5	3 20.554	6 2 22.946	63	63
17	E.	6 5 59.25	3 20.700	6 2 38.550	70	70
18	W.	6 5 42.88	3 20.773	6 2 22.107	67	67
19	E.	6 5 57.88	3 20.837	6 2 37.043	69	70.
				Mean	63.69	64 06

γ BOOTIS.

Nearest point on the Limb, 1° 15′ *N.*

1811. Month.	Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Therm eters. Upper.	Lower.
			+			
February 1	W.	1 16 28.13	3 6.136	1 19 34.266	65	66
2	E.	1 16 18.13	3 6.250	1 19 24.380	66	66
3	E.	1 16 15.63	3 6.364	1 19 21.994	64	65
5	E.	1 16 14.63	3 6.594	1 19 21.224	64	64
6	W.	1 16 26.63	3 6.701	1 19 33.331	59	59
7	E.	1 16 14.63	3 6.810	1 19 21.440	58	58
8	W.	1 16 26 63	3 6 9 1	1 19 33.531	57	58
9	E.	1 16 16.63	3 6.999	1 19 23.626	62	62
11	W.	1 16 28.13	3 7.262	1 19 35.392	65	64
13	E.	1 16 14.26	3 7.311	1 19 21.571	61	60
14	W.	1 16 27.63	3 7.388	1 19 35 0.8	61	61
15	E.	1 16 15 .3	3 7.460	1 19 22.590	63	62
16	W.	1 16 26 63	3 7.532	1 19 34.162	68	69
18	W.	1 16 23 63	3 7 635	1 19 31.265	66	67
19	E.	1 16 15.13	3 7.690	1 19 22.820	67	68
				Mean	63 07	63.27

ARCTURUS.

Nearest point on the Limb, 2° 5′ *N.*

		° ′ ″	+ °	° ′ ″	°	°
January 31	W.	2 5 30 75	3 14.443	2 8 54.193	64	65
February 1	W.	2 5 41.38	3 14 573	2 8 55.953	65	66
2	E.	2 5 29.5	3 14.710	2 8 44.210	66	66
3	E.	2 5 25.5	3 14.833	2 8 40.333	64	65
4	W.	2 5 41.5	3 14.960	2 8 56.460	64	65
5	E.	2 5 28 13	3 15 086	2 8 43.216	63	63
6	W.	2 5 41.5	3 15.205	2 8 56.705	59	59
7	E.	2 5 28.0	3 15 315	2 8 43.315	59	58
8	W.	2 5 39 13	3 15.420	2 8 54.550	56	56
9	E.	2 5 26 88	3 15.530	2 8 42.410	63	63
11	W.	2 5 39.38	3 15 726	2 8 55.106	65	65
12	E.	2 5 28.00	3 15 818	2 8 43.818	66	65
13	W.	2 5 40.13	3 15.905	2 8 56.035	60	60
14	E.	2 5 3 .5	3 15.988	2 8 46.488	61	61
15	W	2 5 41.5	3 16.072	2 8 57.572	61	61
16	E.	2 5 29.0	3 16.148	2 8 45.148	69	70
17	W	2 5 39.5	3 16 213	2 8 55.713	69	69
18	E.	2 5 26.38	3 0 272	2 8 42 652	65	66
19	W.	2 5 35.0	3 16.334	2 8 51.334	66	67
				Mean	63.17	63 74

β BOOTIS.

Nearest point on the Limb, 3° 8′ S.

1815. Month.	Face.	Observed Zenith Distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
February 13	W.	3 31 31.69	2 45.086	3 28 46.544	59	59
14	E.	3 31 42.63	2 45.189	3 28 57.441	60	60
15	W.	3 31 27 13	2 45.294	3 28 41.836	61	61
17	E.	3 31 45. 3	2 45 474	3 28 59.666	68	68
18	W.	3 31 28.63	2 45.563	3 28 43.067	66	66
19	E.	3 31 42.01	2 45.653	3 28 56.357	66	67
21	W.	3 31 30.06	2 45.805	3 28 44.255	68	69
22	E.	3 31 44.76	2 45.859	3 28 58.901	67	68
23	W.	3 31 31 13	2 45 908	3 28 45.222	63	64
24	E.	3 31 45.13	2 45 971	3 28 59.159	61	61
25	W.	3 31 28.76	2 46.028	3 28 42 732	65	65
26	E.	3 31 47.13	2 46.081	3 29 1.049	68	69
				Mean	64.33	6 . 75

β SERPENTIS.

Nearest point on the Limb, 6° 55′ S.

		° ′ ″	° ′	° ′ ″	°	°
February 15	W.	6 53 13.74	2 12 086	6 51 1 654	61	61
17	E.	6 53 33.49	2 12.304	6 51 21 186	66	65
18	W.	6 53 16.37	2 12.4.7	6 51 3.953	65	72
20	W.	6 53 17.51	2 12.605	6 51 1 935	72	67
21	E.	6 53 38.12	2 12.697	6 51 20.423	67	66
22	W.	6 53 18 24	2 12.780	6 51 5 460	65	64
23	E.	6 53 31.37	2 12 865	6 51 21.505	64	61
24	W.	6 53 16.74	2 12 950	6 51 3 790	61	65
25	E.	6 53 37.74	2 13.028	6 51 22.712	65	69
26	W	6 53 18.87	2 13. 12	6 51 2 768	68	68
28	E.	6 53 33 33	2 13.249	6 51 20.081	68	68
March 1	E.	6 53 31.67	2 13.315	6 51 21.355	68	68
2	W.	6 53 15.37	2 13.371	6 51 1.999	68	67
3	E	6 53 37.74	2 13.425	6 51 20.315	67	66
4	W.	6 53 18 37	2 13.472	6 51 4.898	66	66
5	E.	6 53 30 87	2 . 3.514	6 51 23.366	66	
				Mean	66 06	66 19

β SERPENTIS.

Nearest point on the Limb, 2° 5′ S.

1815. Month.		Face.	Observed Zenith distance.	Corrections.	Correct Zenith distance.	Thermometers. Upper.	Lower.
February	15	W.	2 2 45.74	2 5.406	2 0 40.334	60	60
	17	E.	2 3 1.87	2 5.628	2 0 56.242	66	66
	8	W.	2 2 46.87	2 5.734	2 0 41.136	64	64
	19	E.	2 3 1.24	2 5.838	2 0 55.402	66	66
	20	W	2 2 46.74	2 5.925	2 0 40.815	71	71
	21	E.	2 3 1.87	2 6.009	2 0 55.861	69	69
	22	W.	2 2 47.24	2 6.091	2 0 41.149	65	66
	23	E	2 3 2.67	2 6.167	2 0 56.503	63	63
	24	W.	2 2 48.74	2 6 239	2 0 42 501	61	61
	25	E	2 3 2.87	2 6.312	2 0 56.558	64	64
	26	W.	2 2 46.74	2 6.387	2 0 40.253	69	69
	28	E.	2 3 4.67	2 6 518	2 0 58.152	68	68
March	2	W.	2 2 44.24	2 6 624	2 0 37.616	68	68
	3	E.	2 3 0.87	2 6.666	2 0 54.204	67	67
	4	W.	2 2 45 24	2 6.707	2 0 38.533	66	66
	5	E.	2 3 0.94	2 6.748	2 0 54.192	66	66
					Mean	65.81	65.87

ρ SERPENTIS.

Nearest point on the Limb, 1° 45′ S.

			° ′	″	° ′ ″	°	°
February	14	E.	1 47 6.51	1 58.051	1 45 8.449	60	60
	15	W.	1 46 48 33	1 58.177	1 44 50.153	60	60
	17	E.	1 47 5.76	1 58 405	1 45 7.355	65	65
	19	W.	1 46 49 51	1 58.644	1 44 50.886	66	66
	20	E.	1 47 4.13	1 58.713	1 45 5.417	72	72
	21	W.	1 46 50.63	1 58 801	1 44 51.829	68	69
	22	E.	1 47 5.26	1 58.885	1 45 6.375	66	66
	23	W.	1 46 50 93	1 58.966	1 44 51 964	63	63
	24	E.	1 47 5 63	1 59.038	1 45 6.592	60	61
	25	W.	1 46 52.76	1 59 115	1 44 51.645	64	64
	26	E.	1 47 5 88	1 59.193	1 45 6 687	69	70
	28	W.	1 46 52.63	1 59.322	1 44 53 308	68	68
March	1	F.	1 47 6.96	1 59.391	1 45 7.569	68	68
	2	W.	1 46 53.13	1 59.438	1 44 53.692	68	68
	3	E.	1 47 3.76	1 59.483	1 45 4.277	67	67
	4	W.	1 46 51.26	1 59.525	1 44 51.735	66	66
	5	E.	1 47 5.46	1 59.567	1 45 5.893	66	66
					Mea	65.65	65.82

* HERCULIS

Nearest point on the Limb, 1′ 30″ N.

1815. Month.	Face.	Observed Zenith Distances.	Corrections.	Correct Zenith Distances.	Thermometers. Upper.	Thermometers. Lower.
		° ′ ″	+	° ′ ″	°	°
February 17	E.	1 32 7.610	1 39.973	1 33 47.583	66	66
19	W.	1 32 19.560	1 40.197	1 33 59.757	65	65
20	E.	1 32 7.130	1 40.286	1 33 47.416	71	71
21	W.	1 32 19.810	1 40.386	1 34 0.196	68	68
22	E.	1 32 7.260	1 40.480	1 33 47.740	65	66
23	W.	1 32 19.890	1 40.572	1 34 0.462	63	63
24	E.	1 32 4.960	1 40.658	1 33 45.618	60	60
25	W.	1 32 19.460	1 40.741	1 34 0.201	63	63
26	E.	1 32 5.130	1 40.829	1 33 45.959	69	70
28	W.	1 32 21.76	1 40 957	1 34 2.717	67	67
March 1	E.	1 32 5.16	1 41.030	1 33 47.190	68	68
2	W.	1 32 22.46	1 41.081	1 34 23.341	66	66
3	E.	1 32 5.46	1 41.126	1 33 46.586	67	67
4	W.	1 32 21.89	1 41.170	1 34 3.060	66	66
5	E.	1 32 4.76	1 41.210	1 33 45.970	65	65
				Mean	65 93	66.13

11. Means of the Zenith distances, taken on the right and left Arcs, corrected for refraction, equation of the sectorial tube, and the mean runs of the micrometer.

ZENITH DISTANCE PUNNAE STATION.

LEONIS.

1809. Month.	Left Arc. ° ′ ″	1809. Month.	Right Arc. ° ′ ″	Mean. ° ′ ″
April 18	2 36 56.561	April 12	2 36 45.100	2 36 49.362
16	53.928	14	43.520	Refraction, &c. + 2.564
18	54.210	17	43.635	
20	54.116	19	43.161	Zenith distance, 2 36 51.925
24	54.807	23	42.730	
26	56.074	25	43.876	
28	56.101	27	43.523	
30	55.747	29	42.799	
May 3	56.972	May 2	42.106	
6	53.670	5	44.305	
		7	44.646	
Mean	2 36 55.109	Mean	2 36 43.615	

REGULUS.

April 13	4 45 26.359	April 12	4 45 16.280	4 45 19.176
16	23.581	14	14.181	Refraction, &c. + 4.803
18	26.093	17	14.017	
24	23.235	20	12.976	Zenith distance, 4 45 23.979
26	24.117	25	14.799	
28	23.855	27	12.416	
30	24.981	29	11.798	
May 3	26.158	May 2	12.119	
6	24.878	5	12.191	
8	25.759	7	13.817	
Mean	4 45 24.892	Mean	4 45 13.459	

9 LEONIS.

1809. Month.	Left Arc	1809. Month	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
April 18	8 19 50.718	April 17	8 19 49.304	8 19 54.973
20	60.544	19	52.501	
24	60.197	23	47.269	Refraction, &c. + 8.240
25	62.997	25	46.591	Zenith Dist. 8 20 3.213
29	67.712	28	48.306	
May 3	62.486	30	48.139	
5	63.555	May 4	48.521	
7	61.762	6	48.971	
Mean	8 20 1.245	Mean	8 19 48.700	

β LEONIS.

April 13	7 30 17.001	April 12	7 29 57.588	7 30 4.020
16	8.609	14	60.404	Refraction, &c. + 7.588
18	6.305	16	55.649	
20	7.505	19	59.328	Zenith Dist. 7 30 11.608
24	8.963	23	59.566	
26	9.261	25	60.364	
29	11.954	28	59.062	
May 2	11 758	30	55.848	
4	10.466	May 5	56.693	
6	11.270	7	57.779	
Mean	7 30 9.819	Mean	7 29 58.221	

ε VIRGINIS.

April 18	3 51 7.952	April 19	3 50 57.242	3 51 2.195
20	6.152	23	56.845	Refraction, &c. + 3.888
25	6.014	26	56.110	
28	8.321	29	56.218	Zenith Dist. 3 51 6.083
30	9.114	May 3	57.601	
May 4	7.938	5	56 328	
6	6.586	7	57.955	
Mean	3 51 7.440	Mean	3 50 56 951	

δ SERPENTIS.

April 18	3 2 29.029	April 19	3 2 18.294	3 2 22.714
20	27.318	23	18.332	Refraction, &c. + 2.929
24	27.208	25	17 675	
26	26.447	27	17.319	Zenith Dist. 3 2 25.643
28	29.316	29	17.051	
30	29.302	May 3	15.506	
May 5	28.476	6	16.579	
7	28.434			
Mean	3 2 28 91	Mean	3 2 17 237	

SERPENTIS.

1809. Month.	Left Arc.			1809. Month.	Right Arc.			Mean.			
	°	′	″		°	′	″		°	′	″
April 18	8	8	44.015	April 19	8	8	34.013				
20			43.622	23			31.553	Refraction, &c.		+	7.932
24			43.781	25			33.009				
26			46.977	27			34.067	Zenith Dist.	8	8	47.269
28			46.160	29			32.498				
30			46.584	May 3			33.583				
May 6			45.828	7			35.026				
Mean	8	8	45.281	Mean	8	8	33.393				

ZENITH DISTANCES AT NAMTHABAD.

LEONIS.

April 20	4	19	30.673	April 18	4	49	20.169		4	19	25.809
22			29.499	21			21.573	Refraction, &c.		+	4.271
25			31.531	24			19.974				
27			30.642	26			21.088	Zenith Dist.	4	19	30.079
29			30.883	28			21.199				
May 2			31.159	30			21.312				
Mean	4	19	30.731	Mean	4	19	20.886				

REGULUS.

April 20	2	11	3.636	April 18	2	10	52.137		2	10	57.276
22			4.766	21			50.571	Refraction, &c.		+	2.207
24			3.898	23			49.703				
26			3.369	25			49.938	Zenith Dist.	2	10	59.483
28			4.140	27			49.939				
30			3.017	29			52.203				
Mean	2	11	3.804	Mean	2	10	50.749				

LEONIS.

April 18	5	43	29.148	April 20	5	43	18.467		5	43	23.138
21			29.384	22			16.803	Refractions, &c.		+	5.566
23			30.146	24			15.877				
25			30.541	26			16.459	Zenith Dist.	5	43	28.704
27			28.371	29			17.409				
29			27.944	30			17.110				
Mean	5	43	29.256	Mean	5	43	17.021				

9 LEONIS.

1811. Month.		Left Arc.			1811. Month.		Right Arc.			Mean.			
		°	′	″			°	′	″		°	′	″
April	21	1	23	46.701	April	20	1	23	35.794		1	23	40.785
	23			46.386		22			34.478	Refraction, &c.	+		1.253
	25			49.197		24			34.436				
	27			46.003		26			36.109	Zenith Distance,	1	23	42.038
	29			46.194		28			35.409				
May	4			43.990		30			34.718				
	Mean	1	23	46.412		Mean	1	23	35.157				

β LEONIS.

April	18	0	33	52.052	April	20	0	33	43.484		0	33	48.758
	21			55.135		22			43.152	Refraction, &c.	+		0.416
	23			56.688		24			40.708				
	25			55.235		26			42.150	Zenith Distances,	0	33	49.174
	27			56.283		28			44.051				
	29			55.323		30			41.831				
	Mean	0	33	54.953		Mean	0	33	42.563				

ε VIRGINIS.

April	26	3	5	18.485	April	25	3	5	4.120		3	5	11.780
	29			15.677		27			7.328	Refraction, &c.	+		2.960
May	3			16.595		30			8.531				
	Mean	3	5	16.919		Mean	3	5	6.660	Zenith Dist.	3	5	14.750

γ BOOTIS.

May	2	4	16	54.448	May	3	4	16	45.162		4	16	50.218
	4			54.384		5			44.819	Refraction, &c.	+		4.242
	7			55.652		8			45.382				
	9			55.857		12			45.001	Zenith Dist.	4	16	54.460
	Mean	4	16	55.088		Mean	4	16	45.348				

ARCTURUS.

May	2	5	6	18.194	May	1	5	6	6.349		5	6	11.666
	4			16.885		3			7.416	Refraction, &c.	+		5.112
	6			16.679		5			5.721				
	8			17.237		7			6.268	Zenith Distance,	5	6	16.777
	15			14.957		9			5.946				
	Mean	5	6	16.790		Mean	5	6	6.540				

μ BOOTIS.

1811. Month.	Left Arc.	1811. Month.	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
May 3	0 31 39.158	May 4	0 31 31.166	0 31 35.196
5	41.814	7	29.500	Refraction, &c. + 0.672
8	39.859	15	29 541	
				Zenith Distance, 0 31 35.868
Mean	0 31 40 290	Mean	0 31 30.104	

δ SERPENTIS.

May 1	3 53 57.264	May 3	3 53 48.902	3 53 52 382
4	56.544	5	46.679	Refraction, &c. + 3.90
7	58.087	9	47.989	
15	55.731			Zenith Distance, 3 53 56 29
Mean	3 53 56.906	Mean	3 53 47.857	

β SERPENTIS.

May 3	0 56 35.097	May 1	0 56 27.280	0 56 31.745
5	36.618	4	28 307	Refraction, &c. + 0.901
8	36.908	7	26.947	
15	35.952	9	26 814	Zenith Distance, 0 56 32.646
Mean	0 56 36.151	Mean	0 56 27.338	

ν SERPENTIS.

May 3	1 12 25.342	May 1	1 12 18.786	1 12 22.613
5	27.266	4	19.549	Refraction, &c. + 1.105
8	26.021	7	17.554	
15	26 916	9	17.467	Zenith Distance, 1 12 23.718
Mean	1 12 26.886	Mean	1 12 18.339	

ν HERCULIS.

May 2	4 31 19.468	May 1	4 31 9.105	4 31 14 631
4	19.359	3	10.287	Refraction, &c. + 4.472
7	20.186	5	8.924	
9	20.684	8	8.872	Zenith Distance, 4 31 19.103
Mean	4 31 19.924	Mean	4 31 9.337	

ZENITH DISTANCES AT DAUMERGIDDA.

LEONIS.

1815. Month.		Left Arc. °	′	″	1815. Month.		Right Arc. °	′	″	Mean.	°	′	″
Feb.	15	7	16	51.860	Feb.	14	7	16	39.769		7	16	45.874
	17			54.289		16			40.690	Refraction, &c.		+	7.359
	19			51.485		18			41.017				
	23			54 364		22			36.178	Zenith Distance,	7	16	53.233
	25			54.525		24			37.269				
	27			54.397		26			34.981				
March	1			53.877		28			36.454				
	4			55.057	March	3			38 061				
						5			37.724				
	Mean	7	16	53.732		Mean	7	16	38 016				

REGULUS.

Feb.	15	5	8	23.502	Feb.	14	5	8	10.525		5	8	16.466
	17			21.199		16			12.457	Refraction, &c.		+	5.116
	19			22.524		18			10.928				
	22			23.977		21			10.888	Zenith Distance,	5	8	21.582
	24			24.370		25			8 165				
	26			22.861		27			8.856				
	28			22.721	March	3			8.629				
March	4			23.491		5			8.363				
	Mean	5	8	23.081		Mean	5	8	9 851				

γ LEONIS.

Feb.	14	2	46	6.718	Feb.	15	2	45	52.448		2	46	0.198
	16			4.179		17			55 408	Refraction, &c.		+	2,858
	18			6.631		21			53.151				
	22			6.117		24			54.532	Zenith Distance,	2	46	3,056
	25			2.801		26			52.090				
	27			8.923		28			53.676				
March	2			7.283	March	3			54.731				
	4			6.970		5			53.617				
	Mean	2	46	6.689		Mean	2	45	53.707				

ϑ LEONIS.

1815. Month.	Left Arc.	1815. Month.	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
Feb. 13	1 33 43.854	Feb. 14	1 33 32.625	1 33 39.447
17	45.060	16	31.829	Refraction, &c. + 1.478
19	45.903	18	36.416	
23	47.038	22	34.037	Zenith Distance, 1 33. 40.925
25	47.929	24	31.052	
27	46.059	26	33.055	
March 4	46.153	March 3	32.098	
		5	32.046	
	1 33 45.999	Mean	1 33 32 895	

β LEONIS.

Feb. 15	2 23 39 086	Feb. 14	2 23 24.756	2 23 32.008
18	38.120	16	24.802	Refraction, &c. + 2.316
21	38.428	19	26 959	
23	41.347	22	25.917	Zenith Distance, 2 23 34.324
25	40.274	24	23.920	
27	38.521	26	23.925	
March 4	41.054	March 3	22.914	
		5	23 567	
Mean	2 23 39 547	Mean	2 23 24.470	

ε VIRGINIS.

Feb. 3	6 2 37.125	Jan. 31	6 2 21.988	6 2 30.487
5	38.519	Feb. 1	23 366	Refraction, &c, + 6.083
7	40 799	4	24.002	
9	88.586	6	23.410	Zenith Dist. 6 2 36.570
11	37.412	8	19.555	
14	38.653	13	23.736	
17	38.550	15	22 946	
19	37.043	18	22.107	
Mean	6 2 38.336	Mean	6 2 22 639	

γ BOOTIS.

Feb. 1	1 19 34 266	Feb. 2	1 19 24.380	1 19 28.147
6	33.331	3	21 994	Refraction, &c, + 1.188
8	33.531	5	21.224	
1	35.292	7	21.440	Zenith Dist. 1 19 29 335
1	35.018	9	23.626	
16	34.162	13	21.571	
18	31.265	15	22.590	
		19	22.820	
Mean	1 19 33.838	Mean	1 19 22.446	

ARCTURUS.

1815. Month.	Left Arc.	1815. Month.	Right Arc.	Mean.
	° ′ ″		° ′ ″	° ′ ″
Jan. 31	2 8 54.103	Feb. 2	2 8 44.210	2 8 49.436
Feb. 1	55.953	3	40.338	Refraction, &c. + 2.066
4	56.160	5	43.2.6	
6	56.705	7	43.315	Zenith Dist. 2 8 51.502
8	54.550	9	42.410	
11	55.105	12	43.8.8	
13	56.035	14	46.488	
15	57.572	16	46.148	
17	55.713	18	42.652	
19	51 334			
Mean	2 8 55.362	Mean	2 8 43.510	

BOOTIS.

Feb. 14	3 28 57.441	Feb. 13	3 28 46 544	3 28 51.602
17	59 656	15	41.836	Refraction, &c. + 3.448
19	56 357	18	43.067	
22	58.901	21	41.355	Zenith Dist. 3 23 55 050
24	59..59	23	48.222	
26	61.049	25	42.732	
Mean	3 28 58 761	Mean	3 28 44.443	

SERPENTIS.

Feb. 17	6 51 21.185	Feb. 15	6 51 1.654	6 51 12 524
21	20.423	18	3.958	Refraction, &c. + 7.012
23	21.505	20	4.935	
25	22.712	22	5.160	Zenith Dist. 6 51 19.536
28	20.081	24	3.790	
March 1	21.365	26	2.768	
3	20.316	March 2	1.999	
5	23.356	4	4.898	
Mean	6 51 21.367	Mean	6 51 3.682	

SERPENTIS.

Feb. 17	2 0 56.242	Feb. 15	2 0 40.334	2 0 48.097
19	55 402	18	41.136	Refraction, &c. + 2.190
21	55.861	20	40.815	
23	56.503	22	41.149	Zenith Dist. 2 0 50.287
25	56.558	24	42.501	
28	58.152	26	40.358	
March 3	54.204	March 2	37.616	
5	54.192	4	38 533	
Mean	2 0 55.889	Mean	2 0 40.305	

γ SERPENTIS.

1815. Month.	Left Arc.		1815. Month.	Right Arc.		Mean.	
	° ′	″		° ′	″	° ′	″
14	1 45	8 449	Feb. 15	1 44	50.153	1 44	59.207
17		7.358	19		50.886	R. fraction, &c. +	1.658
20		5.417	21		51.829		
22		6.375	23		51.964	Zenith Dist. 1 45	0.865
24		6.592	25		51.645		
26		5 687	28		53.308		
March 1		7.569	March 2		53 692		
3		4.277	4		51.735		
5		5.893					
Mean	1 45	6 513	Mean	1 44	51.901		

γ HERCULIS.

Feb. 19	1 33	59.757	Feb. 17	1 33	47.583	1 33	54.074
21		60.193	20		47.416	Refraction, &c. +	1.395
23		60.462	22		47.740		
25		60.901	24		45.618	Zenith Dist. 1 33	55.469
28		62.717	26		45.959		
March 2		63 311	March 1		47.190		
4		63.060	3		46.586		
			5		45.970		
Mean	1 34	1.391	Mean	1 33	46.788		

12. AMPLITUDE OF THE ARC

Between Namthabad and Daumergidda.

Stars.	Zenith Distances at Namthabad.		Zenith Distances at Daumergidda.		Amplitude.
	° ′ ″		° ′ ″		° ′ ″
α Leonis,	4 19 30 079	S.	7 16 53.233	S.	2 57 23.154
Regulus,	2 10 59.483	S.	5 8 21.582	S.	22 099
γ Leonis,	5 43 28.704	N.	2 46 3.056	N.	25.648
ϑ Leonis,	1 23 42.038	N.	1 33 40 925	S.	22.963
β Leonis,	0 33 49.174	N.	2 23 34.324	S.	23.498
ε Virginis,	3 5 14 750	S.	6 2 36.57	S.	21.820
η Bootis,	4 16 54.46	N.	1 19 29.335	N.	25.125
Arcturus,	5 6 16 777	N.	2 8 51 502	N.	25 275
ε Bootis,	0 31 35.868	S.	3 28 55.050	S.	19.182
δ Serpentis,	3 53 56.29	S.	6 51 19.536	S.	23.246
β Serpentis,	0 56 32.646	N.	2 0 50.287	S.	22.933
γ Serpentis,	1 12 23.718	N.	1 45 0.865	S.	24.583
γ Herculis,	4 31 19.103	N.	1 33 55.469	S.	23.634
			Mean		2 57 23.290

13. AMPLITUDE OF THE ARC

Between Punnae and Daumergidda, by seven corresponding Stars.

Stars.	Zenith Distances at Punnae.	Zenith Distances at Daumergidda.	Amplitude.
	° ′ ″	° ′ ″	° ′ ″
θ Leonis,	2 36 51.926 N.	7 16 53.233 S.	9 53 45.159
Regulus,	4 45 23.979 N.	5 8 21.582 S.	45.861
9 Leonis,	8 20 3.213 N.	1 31 40.925 S.	44.138
β Leonis,	7 30 11.608 N.	2 23 34.324 S.	45.932
ε Virginis,	3 51 6.083 N.	6 2 36.570 S.	42.653
ζ Serpentis,	3 2 25.643 N.	6 51 19.536 S.	45.179
γ Serpentis,	8 8 47.269 N.	1 45 0.865 S.	48.134
		Mean.	9 53 45.257

14. *Celestial Arc* between the parallels of *Putchapolliam* and *Namthabad*, (see A. R. Vol. 12.350) — — ° ′ ″ 4 6 11.28

Terrestrial Arc, (see Art. 9, of the present paper,) — — FEET. 1489131.2

Mean length of one degree, — — FATHOMS. 60487.56

Latitude of the middle point, — — — ° ′ 13 2.55

Celestial Arc between the parallels of *Namthabad* and *Daumergidda*, — — — — — ° ′ ″ 2 57 23.32

Terrestrial Arc, — — — — — FEET. 1073428.2

Mean length of one degree, — — — FATHOMS. 60512.78

Latitude of the middle point, — — — ° ′ ″ 16 34 42

15. It appears by the comparison of the celestial with the terrestrial arcs, that the degree due to latitude 9° 34′ 44″ is 60472 83 fathoms; that due to latitude 13 2.55 is 60487.56 fathoms. And that due to latitude 16° 34′ 42″ is 60512.78 fathoms.

Now in order to obtain a general mean for the ratio of the polar axis to the equatorial diameter of the earth, let each of these be taken separately, *first*, with the French measure; *then* with the English, and *lastly* with the Swedish, which will produce three *means*; from which three, the *general* mean is had. If the formula in page 93, Asiatick Researches, Vol. 12th, be referred to, and the respective latitudes, and the degrees due to them, be substituted, we shall have the results as follows:

First, with the French measurement in latitude $47^\circ\ 24'$.

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(9^\circ\ 34'\ 44'') - \text{Cos.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60472.83}\right)^{\frac{4}{3}}}}{\sqrt{\text{Sin.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60472.83}\right)^{\frac{2}{3}} - \text{Sin.}^2(9^\circ\ 34'\ 44'')}}\ \frac{1}{1.0034562}$$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(13^\circ\ 2'\ 55'') - \text{Cos.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60487.56}\right)^{\frac{4}{3}}}}{\sqrt{\text{Sin.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60487.56}\right)^{\frac{2}{3}} - \text{Sin.}^2(13^\circ\ 2'\ 55'')}}\ \frac{1}{1.0034536}$$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(16^\circ\ 34'\ 42'') - \text{Cos.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60512.78}\right)^{\frac{4}{3}}}}{\sqrt{\text{Sin.}^2(47^\circ\ 24'\ 0'')\cdot\left(\frac{60795.}{60512.78}\right)^{\frac{2}{3}} - \text{Sin.}^2(16^\circ\ 34'\ 42'')}}\ \frac{1}{1.0035787}$$

The Mean of which is $\frac{1}{1.0034295}$

Second, with the English, in latitude $52^\circ\ 2'\ 20''$.

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(9^\circ\ 34'\ 44'') - \text{Cos.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60472.83}\right)^{\frac{4}{3}}}}{\sqrt{\text{Sin.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60472.83}\right)^{\frac{2}{3}} - \text{Sin.}^2(9^\circ\ 34'\ 44'')}}\ \frac{1}{1.0032218}$$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(13^\circ\ 2'\ 55'') - \text{Cos.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60487.56}\right)^{\frac{4}{3}}}}{\sqrt{\text{Sin.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60487.56}\right)^{\frac{2}{3}} - \text{Sin.}^2(13^\circ\ 2'\ 55'')}}\ \frac{1}{1.0032102}$$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(16^\circ\ 34'\ 42'') - \text{Cos.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60512.78}\right)^{\frac{4}{3}}}}{\sqrt{\text{Sin.}^2(52^\circ\ 2'\ 20'')\cdot\left(\frac{60820.}{60512.78}\right)^{\frac{2}{3}} - \text{Sin.}^2(16^\circ\ 34'\ 42'')}}\ \frac{1}{1.0031420}$$

The Mean of which is $\frac{1}{1.0031913}$

Third, with the Swedish measure in latitude $66^{\circ}\ 20'\ 12''$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(9^{\circ}\ 34'\ 44'') - \text{Cos.}^2(66^{\circ}\ 20'\ 12'')\cdot\left(\frac{60955.}{60472.83}\right)^2}}{\sqrt{\text{Sin.}^2(66^{\circ}\ 20'\ 12'')\cdot\left(\frac{60955.}{60472.83}\right)^2 - \text{Sin.}^2(9^{\circ}\ 34'\ 44'')}} = \frac{1}{1.0032702}$$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(13^{\circ}\ 2'\ 55'') - \text{Cos.}^2(66^{\circ}\ 20'\ 12'')\cdot\left(\frac{60955}{60487.56}\right)^2}}{\sqrt{\text{Sin.}^2(66^{\circ}\ 20'\ 12'')\cdot\left(\frac{60955.}{60487.56}\right)^2 - \text{Sin.}^2(13^{\circ}\ 2'\ 55'')}} = \frac{1}{1.0032633}$$

$$\frac{1}{1+e}\ \frac{\sqrt{\text{Cos.}^2(16^{\circ}\ 34'\ 42'') - \text{Cos.}^2(66^{\circ}\ 20'\ 12'')\cdot\left(\frac{60955.}{60512.78}\right)^2}}{\sqrt{\text{Sin.}^2(66^{\circ}\ 20'\ 12'')\cdot\left(\frac{60.955}{60512.78}\right)^2 - \text{Sin.}^2(16^{\circ}\ 34'\ 42'')}} = \frac{1}{1.0032102}$$

The Mean of which is $\frac{1}{1.0032479}$

Hence by comparing these three measurements in India, with the French, gives - $\frac{1}{1.0034295}$

With the English, gives - - $\frac{1}{1.0031913}$

With the Swedish, gives - - $\frac{1}{1.0032479}$

And the *general* mean is - - $\frac{1}{1.0032895}$

Which gives the compression $\frac{1}{303.99}$ or $\frac{1}{304}$ nearly.

16. All this is supposing the earth to be an ellipsoid, but, it will be proper to determine that question from the Indian measurements alone without having recourse to any other. In order to which, let $x^{(1)}$, $x^{(2)}$, $x^{(3)}$, &c. be the measures of *contiguous* degrees on the meridian, whose

respective latitudes are $^{(1)}l$, $^{(2)}l$, $^{(3)}l$, &c. Then it is known that if that meridian of the earth be an ellipse, $\frac{^{(2)}X - {}^{(1)}X}{3\,{}^{(1)}X\,(\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l)}$ will express the compression, let the ratio of the polar to the equatorial diameter be what it will. Hence $\frac{^{(2)}X - {}^{(1)}X}{3\,{}^{(1)}X\,(\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l)}$ is also equal the same compression; and therefore $\frac{^{(3)}X - {}^{(1)}X}{3\,{}^{(1)}X\,(\mathrm{Sin.}^2\,{}^{(3)}l - \mathrm{Sin.}^2\,{}^{(1)}l)} = \frac{^{(2)}X - {}^{(1)}X}{3\,{}^{(1)}X\,(\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l)}$

And by reduction $^{(3)}X = {}^{(1)}X \times {}^{(2)}(X - {}^{(1)}X).\left\{\frac{\mathrm{Sin.}^2\,{}^{(3)}l - \mathrm{Sin.}^2\,{}^{(1)}l}{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}\right\}$

And also $^{(4)}X = {}^{(1)}X + {}^{(2)}(X - {}^{(1)}X).\left\{\frac{\mathrm{Sin.}^2\,{}^{(4)}l - \mathrm{Sin.}^2\,{}^{(1)}l}{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}\right\}$

$^{(5)}X = {}^{(1)}X + {}^{(2)}(X - {}^{(1)}X).\left\{\frac{\mathrm{Sin.}^2\,{}^{(5)}l - \mathrm{Sin.}^2\,{}^{(1)}l}{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}\right\}$ &c.

And therefore $^{(n)}X = {}^{(1)}X + {}^{(2)}(X - {}^{(1)}X).\left\{\frac{\mathrm{Sin.}^2\,{}^{(n)}l - \mathrm{Sin.}^2\,{}^{(1)}l}{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}\right\}$

Also by descending $^{(2)}X = {}^{(1)}X + {}^{(2)}(X - {}^{(1)}X).\left\{\frac{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}\right\} = {}^{(1)}X + {}^{(2)}(X - {}^{(1)}X)$

And $^{(1)}X = {}^{(1)}X + {}^{(2)}(X - {}^{(1)}X).\left\{\frac{\mathrm{Sin.}^2\,{}^{(1)}l - \mathrm{Sin.}^2\,{}^{(1)}l}{\mathrm{Sin.}^2\,{}^{(2)}l - \mathrm{Sin.}^2\,{}^{(1)}l}\right\} = {}^{(1)}X +$

So that if $\overset{(2)}{X} - \overset{(1)}{X}$ be expreſſed by d, we ſhall have

$$\overset{(1)}{X} = \overset{(1)}{X} + o$$

$$\overset{(2)}{X} = \overset{(1)}{X} + d$$

$$\overset{(3)}{X} = \overset{(1)}{X} + d\left\{\frac{\overset{(3)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}{\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}\right\}$$

$$\overset{(4)}{X} = \overset{(1)}{X} + d\left\{\frac{\overset{(4)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}{\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}\right\} \&c.$$

$$\&c. \quad \&c. \quad \&c. \quad \text{to} \quad \overset{(n)}{X} = \overset{(1)}{X} + d\left\{\frac{\overset{(n)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}{\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}\right\}$$

where n denotes the number of degrees, and d the increment to the 1ſt degree. Here it is evident that d is the only unknown quantity to be determined, ſince $\overset{(1)}{X} + \overset{(2)}{X} + \overset{(3)}{X} \ldots \overset{(n)}{X} = A$ the terreſtrial meaſure of an arc of n complete degrees, $\overset{(1)}{X}$ being the meaſure of the firſt degree in latitude $\overset{(1)}{l}$ by obſervation.

Hence $A = n\overset{(1)}{X} + d\left(o + 1 + \frac{\overset{(3)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}{\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}} \ldots \frac{\overset{(n)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}{\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}}\right)$

And $d = \frac{(A - n\overset{(1)}{X}) \cdot (\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l})}{(\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}) + (\overset{(3)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l}) \&c. \ldots + (\overset{(n)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l})}$

whence d becomes a known quantity; and ſince $(\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l})$ is a conſtant and known quantity, if $\frac{d}{(\overset{(2)}{\mathrm{Sin.}^2 l} - \overset{(1)}{\mathrm{Sin.}^2 l})}$ be denoted by Q,

we ſhall have the order of the contiguous degrees as follows:

$$\overset{(1)}{X} = \overset{(1)}{X} + o$$

$$\overset{(2)}{X} = \overset{(1)}{X} + d$$

$$\overset{(3)}{X} = \overset{(1)}{X} + Q\,(\mathrm{Sin.}^2\,\overset{(3)}{l} - \mathrm{Sin.}^2\,\overset{(1)}{l})$$

$$\overset{(4)}{X} = \overset{(1)}{X} + Q\,(\mathrm{Sin.}^2\,\overset{(4)}{l} - \mathrm{Sin.}^2\,\overset{(1)}{l})\ \&c.$$

$$\text{to } \overset{(n)}{X} = \overset{(1)}{X} + Q\,(\mathrm{Sin.}^2\,\overset{(n)}{l} - \mathrm{Sin.}^2\,\overset{(1)}{l})$$

When the degrees are deſcending from $\overset{(1)}{x}$ in latitude $\overset{(1)}{l}$, then let $\overset{(-1)}{X}$ be the next lower degree in lat. $\overset{(-1)}{l}$; $\overset{(-2)}{X}$ the next for lat. $\overset{(-2)}{l}$ &c.

$$\text{then } \frac{\overset{(1)}{X} - \overset{(-1)}{X}}{3\,\overset{(1)}{X}\,(\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-1)}{l})} = \frac{\overset{(1)}{X} - \overset{(-2)}{X}}{3\,\overset{(1)}{X}\,(\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-2)}{l})}$$

$$\text{And therefore } \overset{(-2)}{X} = \overset{(1)}{X} - (\overset{(1)}{X} - \overset{(-1)}{X}).\left\{\frac{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-2)}{l}}{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-1)}{l}}\right\}$$

Or putting $\overset{(1)}{X} - \overset{(-1)}{X} = \overset{1}{d}$ we ſhall have,

$$\overset{(1)}{X} = \overset{(1)}{X} - o$$

$$\overset{(-1)}{X} = \overset{(1)}{X} - \overset{1}{d}$$

$$\overset{(-2)}{X} = \overset{(1)}{X} - \overset{1}{d}\left\{\frac{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-2)}{l}}{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-1)}{l}}\right\}$$

$$\overset{(-3)}{X} = \overset{(1)}{X} - \overset{1}{d}\left\{\frac{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-3)}{l}}{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-1)}{l}}\right\}$$

$$\overset{(4)}{X} = \overset{(1)}{X} - \overset{1}{d}\left\{\frac{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-4)}{l}}{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-1)}{l}}\right\}\ \&c.$$

$$\text{to } \overset{(-n)}{X} = \overset{(1)}{X} - \overset{1}{d}\left\{\frac{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-n)}{l}}{\mathrm{Sin.}^2\,\overset{(1)}{l} - \mathrm{Sin.}^2\,\overset{(-1)}{l}}\right\}\text{which reduced,}$$

gives $\overset{1}{d} = \dfrac{(n\overset{(1)}{X} - \overset{1}{A}) \cdot (\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-1)}{l})}{(\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-1)}{l}) + (\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-2)}{l}) \text{ \&c.} \ldots (\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-n)}{l})}$

where $\overset{1}{A}$ is the terrestrial arc in fathoms and n the number of complete degrees, Then when $\overset{1}{d}$ is found, put $Q = \dfrac{\overset{1}{d}}{(\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(1)}{l})}$ we shall have $\overset{(1)}{X} = \overset{(1)}{X} + o$

$$\overset{(1)}{X} = \overset{(1)}{X} - \overset{1}{d}$$

$$\overset{(2)}{X} = \overset{(1)}{X} - \overset{1}{Q}\,(\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-2)}{l})$$

$$\overset{(3)}{X} = \overset{(1)}{X} - \overset{1}{Q}\,(\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-3)}{l})$$

$$\overset{(4)}{X} = \overset{(1)}{X} - \overset{1}{Q}\,(\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-4)}{l}) \text{ \&c.}$$

to $\overset{(n)}{X} = \overset{(1)}{X} - \overset{1}{Q}\,(\text{Sin.}^2 \overset{(1)}{l} - \text{Sin.}^2 \overset{(-n)}{l})$

To apply the first formula to the present measurement, it will be necessary to have a terrestrial arc to correspond with a celestial one of *complete* degrees, and the first degree determined by observation. If we begin with the degree in latitude $9^\circ\ 34'\ 44''$, which is 60472.83 fathoms as the mean degree deduced from an arc of $2^\circ\ 50'\ 10''.54$ where the corresponding terrestrial arc, or the distance between *Punnae* station, and that at *Putchapolliam* is - - - - *Fathoms.* 171516.75

The half of which is the distance of the middle point of the degree from *Putchapolliam* = - - - - 85758.375

To which add half the degree south, or - - 30236.415

Their sum is the terrestrial arc between half the degree south of the middle point and *Putchapolliam*, - - - - 115994.792

The latitude of whose commencement is 9° 34′ 43″.6 *minus* 30′ or 9° 4′ 43″,6 the latitude of the south extremity of an arc of complete degrees. Now the terrestrial arc between *Putchapolliam* and *Namthabad* is 248188.534

Between *Namthabad* and *Daumergidda* is 178904 700

To which add the above 115994.790

Their sum is the terestrial arc between 9° 4′ 43″.6 and *Daumergidda*, ... 543088 024

The latitude of *Daumergidda* by adding the arc between *Namthabad* and *Daumergidda* by 13 Stars, or (2° 57′ 23″.32) to the latitude of *Namthabad* (*15° 6′ 0″.21) is . . 18° 3′ 23″.58

The same latitude by adding the whole arc between *Punnae* and *Daumergidda* by seven corresponding Stars, (9° 53′ 45″.25) to the latitude of *Punnae* (8° 9′ 38″.39 is 18 3 23.64

Gives the mean or correct latitude of *Daumergidda*, 18 3 23 58

Hence from 18° 3′ 23″.58

Subtract 9 4 43.66

			Fathoms.
Difference or arc	8 58 39.[illegible]	se measure is	543088.024
To which add . .	1 20.0	se measure is	1345.184
Gives the number *n* of complete degrees	9 0 0	whose measure (*A*) is	544433 208

* The latitude of *Namthabad* as given in my last paper (A. R. Vol. 12,) was 15° 6′ 0″.6, but the latitude here given is considered more correct, and is had by adding the celestial arc between *Putchapolliam* and *Namthabad*, to the latitude of *Putchapolliam*, which last is obtained by adding the arc between *Punnae* and *Putchapolliam* to the latitude of *Punnae* station.

Now the meaſure of the firſt degree or $\overset{1}{X}$ is 60472 83 fathoms and $n = 9$. Therefore $n \overset{(1)}{X} = 544255.47$ which ſubtracted from A or 544433.208 gives $177.74 = A - n \overset{(1)}{X}$.

And $\text{Sin.}^2 \overset{(2)}{l} - \text{Sin.}^2 \overset{(1)}{l} =, 006014$ &c., $c06014 \times 177.74 = 1.0689284$ equal $(A - n \overset{(1)}{X}) . (\text{Sin.}^2 \overset{(2)}{l} - \text{Sin.}^2 \overset{(1)}{l})$ the numerator; and the denominator $(\text{Sin.}^2 \overset{(2)}{l} - \text{Sin.}^2 \overset{(1)}{l}) + (\text{Sin.}^2 \overset{(3)}{l} - \text{Sin.}^2 \overset{(1)}{l}) + (\text{Sin.}^2 \overset{(4)}{l} - \text{Sin.}^2 \overset{(1)}{l})$ &c. . . . . $(\text{Sin.}^2 \overset{(9)}{l} - \text{Sin.}^2 \overset{(1)}{l})$ is ,2631370.

Hence $\dfrac{(A - n \overset{(1)}{X}) . (\text{Sin.}^2 \overset{(2)}{l} - \text{Sin.}^2 \overset{(1)}{l})}{(\text{Sin.}^2 \overset{(2)}{l} - \text{Sin.}^2 \overset{(1)}{l}) + \ldots (\text{Sin.}^2 \overset{(9)}{l} - \text{Sin.}^2 \overset{(1)}{l})} = \dfrac{1.0689284}{,2631370} = 4.06225 = d$;

and $\dfrac{d}{(\text{Sin.}^2 \overset{(2)}{l} - \text{Sin.}^2 \overset{(1)}{l})} = \dfrac{4.06225}{,006014} = 675.47 = Q$

TABLE I.

	Degree in Fathoms.	Latitude.
$\overset{(1)}{X} = \overset{(1)}{X} + o$	60472.83	9 34 44
$\overset{(2)}{X} = \overset{(1)}{X} + d$	60476.89	10 34 44
$\overset{(3)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(3)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60481.34	11 34 44
$\overset{(4)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(4)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60486.16	12 34 44
$\overset{(5)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(5)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60491.36	13 34 44
$\overset{(6)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(6)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60496.92	14 34 44
$\overset{(7)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(7)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60502.85	15 34 44
$\overset{(8)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(8)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60509.13	16 34 44
$\overset{(9)}{X} = \overset{(1)}{X} + Q\ (\text{Sin.}^2 \overset{(9)}{l} - \text{Sin.}^2 \overset{(1)}{l})$	60515.74	17 34 44
	$544433.31 = A$	

According to this table the degree in latitude $16^\circ\ 34'\ 44''$ is 60509.12 and the mean degree for latitude 16 34 42 as deduced from the arc between *Namthabad* and *Daumergidda* is 60512.78 fathoms, which exceeds the computed one only 3.66 fathoms. It may however be necessary to examine what compreſſion will be brought out by uſing $\overset{(2)}{X}$ 60472.83 for $\overset{(1)}{X}$, for $\frac{\overset{(2)}{X} - \overset{(1)}{X}}{3\overset{(1)}{X}(\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l})} = \frac{4.062225}{3 \times 60472.83 \times ,006014} = \frac{1}{268.6}$ nearly, which differs conſiderably from that given by the general mean.

If we ſuppoſe $\frac{1}{304}$ to be the true compreſſion, let it be determined what the value of $\overset{(1)}{X}$ ought to be to bring it out, and by that means detect the errors of the obſerved degrees $\overset{(1)}{X}$, and that in $16^\circ\ 34'\ 42''$, which laſt may be compared with $\overset{(0)}{X}$.—Put $A = 544433\ 21$, $a = (\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l}) = ,006014$, $b = (\text{Sin.}^2\overset{(2)}{l} - \text{Sin.}^2\overset{(1)}{l}) + \ldots (\text{Sin.}^2\overset{(9)}{l} - \text{Sin.}^2\overset{(1)}{l}) = ,263137$. Then ſince $d = \frac{(A - n\overset{(1)}{X}) \cdot a}{b} = \overset{(2)}{X} - \overset{(1)}{X}$; $\frac{d}{3\overset{(1)}{X}(n)} = \frac{A - n\overset{(1)}{X}}{3b\overset{(1)}{X}} = \frac{1}{304}$ from which is obtained $\overset{(1)}{X} = \frac{304 \cdot A}{3b + 304 \cdot n} =$ 60475.13 whence $d = \frac{(A - n\overset{(1)}{X}) \cdot ,006014}{,263137} = 3.58911$, and $Q = \frac{d}{,006014} = 596.79$. From theſe, the following table has been computed, from which it appears that the *firſt* degree by meaſurement is 2, 3 fathoms in defect, and *that* in latitude $16^\circ\ 34'\ 42''$ is 5.59 fathoms in exceſs, both quantities too ſmall to affect the elliptic hypotheſis; the greateſt being leſs than $\frac{1}{4}$ of a ſecond on the earth's ſurface.

TABLE II.

	Degree in Fathoms.	Latitude.
$X = {}^{(1)}X + {}^{(1)}o$	60479.13	9 34 44
$X = {}^{(1)}X + {}^{(1)}d$	60478.72	10 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60482.68	11 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60486.94	12 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60491.5	13 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60496.42	14 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60501.65	15 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60507.19	16 34 44
$X = {}^{(1)}X + Q\,(\mathrm{Sin.}^2\, l - \mathrm{Sin.}^2\, {}^{(1)}l)$	60513.04	17 34 44
	544433.21 $= A$	

From inſpecting theſe two tables, it appears that the degree in latitude $13^\circ\ 34'\ 44''$ is very nearly the ſame in each: the mean being 60491.4 fathoms, which certainly muſt be near the truth. We ſhall therefore adopt it in future with the compreſſion $\frac{1}{304}$ for computing the general tables of degrees for every latitude from the Equator to the pole.

17. If the method be adopted which is pointed out in the 42d No. of the *Edinburgh Review*, where we may call ${}^{(1)}X$, ${}^{(2)}X$, ${}^{(3)}X$, &c. . . . . ${}^{(n)}X$, the degrees for latitudes $L.\ L + 1^\circ$, $L + 2^\circ$, $L + 3^\circ$, &c. . . . . $L + (n-1)^\circ$. Now as the increment to each ſucceeding degree will always be *as* the ſine of twice the latitude; or if m be any multiple of the ſine of twice the latitude, to be determined by certain data, the increment

to each ſucceſſive degree will be m . Sin. 2 latitude of the middle point of that degree, ſo that

$$\overset{(1)}{X} = \overset{(1)}{X} + o \text{ for latitude } . (L + o)$$

$$\overset{(2)}{X} = \overset{(1)}{X} + o + m \text{ . Sin. 2 } (L + o)$$

$$\overset{(3)}{X} = \overset{(1)}{X} + o + m \text{ . Sin. 2 } (L + o) \quad m \text{ . Sin. 2 } (L + \overset{\circ}{1})$$

$$\overset{(4)}{X} = \overset{(1)}{X} + o + m \text{ . Sin. 2 } (L + o) - m \text{ . Sin. 2 } (L + \overset{\circ}{2}) \quad m \text{ . Sin. 2 } (L \quad \overset{\circ}{2})$$

That is $\overset{(1)}{X} = \overset{(1)}{X} + o$ for lat. $(L + \overset{\circ}{o})$

$$\overset{(2)}{X} = \overset{(1)}{X} + m \text{ (Sin. 2 } (L + \overset{\circ}{o})$$

$$\overset{(3)}{X} = \overset{(1)}{X} + m \left\{ \begin{matrix} \text{Sin. 2 } (L + \overset{\circ}{o}) \\ \text{Sin. 2 } (L + \overset{\circ}{1}) \end{matrix} \right\}$$

$$\overset{(4)}{X} = \overset{(1)}{X} + m \left\{ \begin{matrix} \text{Sin. 2 } (L + \overset{\circ}{0}) \\ \text{Sin. 2 } (L + \overset{\circ}{1}) \\ \text{Sin. 2 } (L + \overset{\circ}{2}) \end{matrix} \right\} \text{&c.}$$

$$\overset{(n)}{X} = \overset{(1)}{X} + m \left\{ \begin{matrix} \text{Sin. 2 } (L + \overset{\circ}{0}) \\ \text{Sin. 2 } (L + \overset{\circ}{1}) \\ \text{Sin. 2 } (L + \overset{\circ}{2}) \text{ &c.} \\ \text{to Sin. 2 } (L + (n - \overset{\circ}{2})) \end{matrix} \right\}$$

Put $\overset{(1)}{X} + \overset{(2)}{X} + \overset{(3)}{X} + \overset{(4)}{X} \ldots . \overset{(n)}{X} = A$

Then $A = n \overset{(1)}{X} + m \left\{ \overline{n - 1} \text{ . Sin. 2 } (L + \overset{\circ}{o}) + \overline{n - 2} \text{ . Sin. 2 } (L + \overset{\circ}{1}) \right.$

$\left. + \overline{n - 3} \text{ . Sin. 2 } (L + 2) + \overline{n - 4} \text{ Sin. 2 } (L + \overset{\circ}{3}) \text{ &c.} \right\}$

And $m = \dfrac{A - n \overset{(1)}{X}}{\overline{n - 1} \text{ . Sin. 2 } (L + \overset{\circ}{o}) + \overline{n - 2} \text{ . Sin. 2 } (L + \overset{\circ}{1}) \times \overline{n - 3} \text{ . Sin. 2 } (L + \overset{\circ}{3}) \text{ &c.}}$

Now m being determined, it will be eaſy to compute the ſucceſſive degrees, for from the above arrangement it appears that

$$\overset{(1)}{X} = \overset{(0)}{X} + \epsilon$$

$$\overset{(2)}{X} = \overset{(1)}{X} + m \cdot \text{Sin. } 2\,(L + \overset{\circ}{0})$$

$$\overset{(3)}{X} = \overset{(2)}{X} + m \cdot \text{Sin. } 2\,(L + \overset{\circ}{1})$$

$$\overset{(4)}{X} = \overset{(3)}{X} + m \cdot \text{Sin. } 2\,(L + \overset{\circ}{2})$$

$$\overset{(5)}{X} = \overset{(4)}{X} + m \cdot \text{Sin. } 2\,(L + \overset{\circ}{3}) \text{ &c.}$$

$$\text{to } \overset{(n)}{X} = \overset{(n-1)}{X} + m \cdot \text{Sin. } 2\,(L + \overset{\circ}{(n-2)})$$

THEN in order to get the value of m; Let $A = 544433{,}21$, $n = 9$; $L = 9\ 34\ 44$; $\overset{(1)}{X} = 60472{,}83$. — Then $A - 9\,\overset{(1)}{X} = 177\ 74$ the numerator.

But $\overline{n-1}$ Sin. 2 $(L + \overset{\circ}{0}) = 8$. Sin. $(19\ 9\ 28)$ 2.6253648

$\overline{n-2}$ Sin. 2 $(L + 1) = 7$. Sin. $(21\ 9\ 28)$ 2.5265618

$\overline{n-3}$ Sin. 2 $(L + 2) = 6$. Sin. $(23\ 9\ 28)$ 2.3595870

$\overline{n-4}$ Sin. 2 $(L + 3) = 5$. Sin. $(25\ 9\ 28)$ 2.1255625

$\overline{n-5}$ Sin. 2 $(L + 4) = 4$. Sin. $(27\ 9\ 28)$ 1.8257696

$\overline{n-6}$ Sin. 2 $(L + 5) = 3$. Sin. $(29\ 9\ 28)$ 1.4616489

$\overline{n-7}$ Sin. 2 $(L + 6) = 2$. Sin. $(31\ 9\ 28)$ 1.0347932

$\overline{n-8}$ Sin. 2 $(L + 7) = 1$. Sin. $(33\ 9\ 28)$ 0.5469165

Sum — 14.5062343

HENCE $\dfrac{177.74}{14.5062343} = 12{,}2527 = m.$

HENCE if the aforesaid value of m be substituted in the above, and multiplied by the sines of $19\ 9\ 28$; $21\ 9\ 28$; $23\ 9\ 28$, &c. respectively, we shall have the degrees as follows: —

$\overset{(1)}{X} = 60472\ 83$ fathoms, for Latitude ..... $9\ 34\ 44$

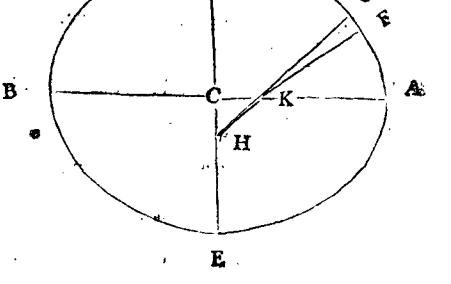
$\overset{(2)}{X} = 60476.85$ ..... $10\ 31\ 46$

(3) X = 60481.27 ..... 11 34 44
(4) X = 60486.09 ..... 12 34 44
(5) X = 60491.3 ..... 13 34 44
(6) X = 60496.89 ..... 14 34 44
(7) X = 60502.86 ..... 15 34 44
(8) X = 60509.21 ..... 16 34 44
(9) X = 60515.91 ..... 17 34 44

These results are the same very nearly as in the above table 1st, and *m*. Sin. (19 9 28,) is the same as *d* in the former case.

18. With respect to the compression, that nothing may be left undone to give full and entire satisfaction on that subject, I shall here add an investigation similar to that given by Professor *Playfair* in the 5th Vol. of the *Edinburgh Philosophical Transactions*, where in place of using the measures of single degrees due to particular latitudes, two measured arcs of large amplitudes are made use of, the latitudes of whose extremities are determined with great accuracy.

Let *A*, *D*, *B*, *E*, be a meridian of the earth, where *A* is at the equator, and *D* at the pole. Suppose *F* to be any point on that meridian, and *F H* the radius of curvature of the ellipse at the said point. Put *A C* = *a*, *D C* = *b*, *C* being the center of the ellipse; and let *A* be equal the angle *A K F*, the latitude of *F*, or let it be the *measure* of the arc of latitude to rad. 1; that is, the *measure* of the angle *A K F* in parts of the rad. 1.—If *G F* be an indefi-



nitely small part of the ellipse; then if $A\ F = z$, $G\ F = \dot{z}$ the fluxion of the arc $A\ F$. And of $G\ H$ be drawn, then the angle $G\ H\ F = \dot{A}$ the fluxion of the arc of latitude to rad. 1.—Hence as $1 : \dot{A} :: F\ H : \dot{z} = \dot{A} + F\ H$. But the radius of curvature $F\ H = a^2\ b^2\ (a^2 - a^2 \cdot \text{Sin.}^2\ A + b^2 \cdot \text{Sin.}^2\ A)^{-\frac{3}{2}}$. Then if $c = a - b$ we have $b = a - c$, and $b^2 = a^2 - 2\ a\ c + c^2 = a^2 - 2\ a\ c$ nearly since c is very small compared with a or b. — Hence $F\ H = a^2\ (a - a\ c) \cdot (a^2 - 2\ a\ c \cdot \text{Sin.}^2\ A)^{-\frac{1}{2}}$. But $(a^2 - 2\ a\ c \cdot \text{Sin.}^2\ A)^{-\frac{1}{2}}$ expanded is equal to $a^{-3}\ (1 + \frac{3\ c}{a} \cdot \text{Sin.}^2\ A)$ nearly, by rejecting all the terms involving c^2 and therefore $F\ H = a - 2\ c + 3\ c \cdot \text{Sin.}^2\ A$, which substituted for $F\ H$, we get $\dot{z} = \dot{A}\ (a - 2\ c + 3\ c \cdot \text{Sin.}^2\ A) = \dot{A}\ (a - 2\ c) + \dot{A}\ (3\ c \cdot \text{Sin.}^2\ A)$. But $\text{Sin.}^2\ A = \frac{1 - \text{Cos.}\ 2\ A}{2}$ and therefore $\dot{z} = \dot{A}\ (a - 2\ c) + \frac{1}{2} \cdot c\ \dot{A} - \frac{3}{2} \cdot c\ \dot{A} \cdot \text{Cos.}\ 2\ A$ whose fluent is $z = (a - c)\ A - \frac{3}{4}\ c \cdot \text{Sin.}\ 2\ A = a\ A - c\ (\frac{A}{2} + \frac{3}{4}\ A \cdot \text{Sin.}\ 2\ A)$ which requires no correction; and this is the measure of an arc on the meridian extending from the equator to the latitude of the point F, where A denotes the arc of latitude in parts of the rad. 1.

Let N be any other point whose arc of latitude is $\dot{A}$. Then $\dot{A}\ N = a\ \dot{A} - c\ \{\frac{\dot{A}}{2} + \frac{3}{4}\ \dot{A} \cdot \text{Sin.}\ 2\ \dot{A}\}$ and hence we get $F\ N = a\ (\dot{A} - A) - c\ \{\frac{\dot{A} - A}{2} + \frac{3}{4}\ \text{Sin.}\ 2\ \dot{A} - \frac{3}{4}\ \text{Sin.}\ 2\ A\}$. Put $\dot{A} - A = m$, $\frac{\dot{A} - A}{1} + \frac{3}{4}\ \text{Sin.}\ 2\ \dot{A} - \frac{3}{4} \cdot \text{Sin.}\ 2\ A = n$, and L the length of the measured arc in fathoms,

then $L = mA - nA$. Now if any other arc be measured whose length in fathoms is ^{1}L and whose extremities are in latitudes ^{11}A and ^{111}A; and if $^{1}m = {}^{111}A - {}^{11}A$, also $^{1}n = \frac{{}^{111}A - {}^{11}A}{2} \cdot \frac{3}{4}$. Sin. $2\,{}^{111}A - \frac{3}{4}$. Sin. $2\,{}^{11}A$, then $^{1}L = {}^{1}m\,a - {}^{1}n\,c$ from which two equations we get $a = \frac{{}^{1}nL - {}^{1}nL}{{}^{1}m\,{}^{1}n - {}^{1}m\,{}^{1}n}$ and $c = \frac{{}^{1}mL - {}^{1}mL}{{}^{1}m\,{}^{1}n - {}^{1}m\,{}^{1}n}$ and $\frac{c}{a} = \frac{{}^{1}mL - {}^{1}mL}{{}^{1}nL - {}^{1}nL}$ the compression.

To apply this to the case in question,

Let A be the latitude of Punnae	8	9	38.4
^{1}A be that of *Daumergidda*	18	3	23.6
$m = {}^{1}A - A$ equal	9	53	45.2 = , 1727158
^{11}A the latitude of *Dunkirk*	51	2	1
^{111}A that of *Barcelona*	41	21	48.8
$n = A - {}^{11}A$ equal	9	40	12.2 = , 1687744
$^{1}n = \frac{{}^{1}A - A}{2} \cdot \frac{3}{4}$. Sin. $2\,{}^{1}A - \frac{3}{4}$. Sin. $2\,A$ equal			, 3176258
$^{1}n = \frac{{}^{111}A - {}^{11}A}{2} \cdot \frac{3}{4}$. Sin. $2\,A - \frac{3}{4}$. Sin. $2\,{}^{11}A$ equal			, 0738488

$L = 598610$ fathoms } the arc { *Punnae* and *Daumergidda*.
$^{1}L = 587987$ fathoms } between { *Barcelona* and *Dunkirk*.

Then $\frac{{}^{1}mL - {}^{1}mL}{{}^{1}nL - {}^{1}nL} = \frac{1}{272}$ nearly, which differs considerably from that

brought out by the general mean. However as I am not at present in poſſeſſion of the account of the Swediſh meaſurement, nor of that of the Engliſh ſince the operations have been extended to the northward of Clifton, I ſhall not depend on this ſingle compariſon but abide by the compreſſion $\frac{1}{304}$ which for reaſons already given, cannot be far from the truth.

19. Since then it is determined to adopt $\frac{1}{304}$ as the compreſſion, and 60491.4 fathoms for the meaſure of the degree due to latitude $13^\circ\ 34'\ 44''$, we ſhall have $m = 60491.4$; $l = 13^\circ\ 34'\ 44''$; and the fraction $\frac{1}{304}$ will give $1 + e = 1.0032896$. Then let A $57^\circ\ 2957795$, the arc equal radius, and a = equatorial diameter; we have $\frac{1}{2}a = \frac{m A\ (\text{Cos.}^2 l.\ (1+e)^2 + (\text{Sin.}^2 l)^{\frac{1}{2}}}{1+e} = 3486852.4$ fathoms for the radius of the equatorial circle, which divided by 57° &c. gives 60857.05 fathoms for the degree on the equator which will be of uſe for computing both the degrees perpendicular to the meridian, and the degrees of longitude. Then becauſe the ratio of the two diameters is as $1 : 1.0032896$; we ſhall have the ſemi-polar axis $= \frac{\frac{1}{2}a}{1+e} = \frac{3486852.4}{1.0032896} = 3476119.66$ fathoms. Since m is the degree for latitude l, let m be the degree for any other latitude l. Then by the formula in art. 2 (Aſiatick Res. vol. 12th, page 93,) we have $m = \frac{m\ (\text{Cos.}^2 l.\ (1+e) + \text{Sin.}^2 l)^{\frac{1}{2}}}{\text{Cos.}^2 l.\ (1+e)^2 + \text{Sin.}^2 l)^{\frac{1}{2}}}$ and if m be at the equator where Cos. $l = 1$, and Sin. $l = 0$, Then $m = \frac{m\ (\text{Cos.}^2 l.\ (1+e)^2 + \text{Sin.}^2 l)^{\frac{1}{2}}}{1+e}$. Now if 60491.4 be ſubſtituted for m and $13^\circ\ 34'\ 44''$ for l, we have $m =$

$60491.4\left(\frac{\text{Cos.}^2\ 13^\circ\ 31'\ 41''\ .\ (1.0032896)^3 + \text{Sin.}^2\ (13^\circ\ 31'\ 41''}{(1.0032896)^3}\right)^{\frac{1}{2}} = 60458.64$ for the degree on the meridian whofe middle point is on the equator.—*Bouguer's* degree meafured under the equator in *South America* was 60482 fathoms, which exceeds this by upwards of 23 fathoms. It is *Bouguer's* meafurement which the *French* Mathematicians have ufed with that of *De Lambre*, and they have made the compreffion to be $\frac{1}{334}$.

For the length of the quadrantal arc of the elliptic meridian, fince a is the longer diameter, $a \times 3.14159$ &c. will be the length of the circumfcribing circle, or the circle whofe diameter is 6973905 fathoms, and circumference equal 6973905×3.14 &c. $= 21908630$ fathoms.

Put $d = 1 - \frac{b^2}{a^2} = .00656$ nearly.

Then as $1 : 1 - \frac{d^2}{2^2} - \frac{3d^2}{2^2 4^2}$ &c. :: a . 3 141 &c. : a . 3.14159 &c. $\left(1 - \frac{d}{2^2} - \frac{3d^2}{2^2 4^2}\right.$ &c.$) = 21908630 \times .998358$ equal 21872656 fathoms, the whole circumference of the elliptic meridian, whofe tranfverfe axis is the length a of the equatorial diameter, or 6973905 fathoms, and whofe conjugate axis is b, equal 6950339 fathoms, the length of the polar axis. Hence $\frac{21872656}{4} = 5468164$ fathoms, the length of the quadrantal arc; which reduced to inches and divided by 10,000,000 will give 39.3728 *Engliſh* inches for the length of the *French* metre at the temperature of 62°. But the French ſtandard is at the temperature of 32°, at which the metre by their meaſurement was 39,38272 *Engliſh* inches, which according to the rate of expanſion in braſs, of which the ſtandards

are made, would, at the temperature of 62° be reduced to 39,371 *Engliſh* inches, which differs from the above, only ,0002 inches, quantity altogether inſenſible. The *metre*, as it is termed by the *French*, is the unit of meaſure, and is adopted as ſuch by moſt of the nations on the continent. The *Engliſh*, as a great commercial people, have never yet been able to fix upon a ſtandard, though they have for ages experienced the want of it, and their averſion to receiving any thing that is foreign, as a guide, has left them at this day without any ſtandard in nature to which they can refer. There cannot in my opinion, be any thing more ſimple, than to take ſome fractional part of a quadrant of the earth's meridian, whoſe length has been unqueſtionably ſettled; and a ſecond ſtandard meaſure, call it what they pleaſe, could always be referred to the braſs ſtandard ſcale; and if, at the temperature of 62°, the meaſure of 39,371 inches be taken off, we know *that* to be exactly the ten millionth part of a quadrant of the meridian, which muſt be for ever invariable.

The unit of meaſure being once determined upon, it's multiples and ſub-multiples may be arranged according to any ſyſtem beſt adapted to the habitual mode of counting. The *French Philoſophers* have choſen the *decimal* ſyſtem altogether. The multiples, which are named from the *Greek* numerals, are the *deci-metre*, equal to *ten* metres; the *hecto-metre*, equal to *ten* decametres; the *kilo-metre*, equal to *ten* hectometres, &c. The ſub-multiples are from the *Latin* numerals, where the *deci-metre* is equal $\frac{1}{10}$ of the metre; the *centi-metre* equal $\frac{1}{10}$ the decimetre, and the *milli metre* equal $\frac{1}{10}$ the centimetre, &c.

For the unit of meaſure for *capacity*, the decimetre is cubed, and

called the *litre*, and is equal to 2 $\frac{1}{8}$ *English* pints, wine measure. The unit of measure for weight, is the weight of a cubic centimetre of distilled water, at the temperature of 32°.

This system is extremely simple and ingenious, and promises perpetuity, whenever the old prejudice in favor of the ancient weights and measures shall be overcome; and notwithstanding its foreign origin, I shall still hope that an enlightened nation like ours, will adopt either this, or some other one, on similar principles. New names seem to be absolutely necessary, and I do not know of any that are more appropriate, than those which the *French* mathematicians have made use of. We have no measure which corresponds with any fractional part of the quadrantal arc of the meridian. The fathom may be called the nearest, but it certainly is not so simple a fraction as the 10,cooooth part, and if we were to increase the yard to correspond with the metre, we should have to increase the inch, the foot, and every other measure in the same proportion; superficial and cubic measures would have also to undergo the same change. The system, which has already been adopted by nearly all the nations on the continent, would the most easily become universal.

20. Elevations and Depressions, contained Arcs, Terrestrial Refractions, together with the heights above the level of the Sea, of the principal Stations.

Stations at	Stations observed.	Apparent Zenith distances and depressions	Contained Arcs.	Refraction.	Elevation above the Sea. Stations.	Elevation above the Sea.
		° ′ ″	′ ″			feet.
Caddiken	Arakerrabetta ..	0 2 17 E	1 17 31	1/8	Arrakerrabetta .	2202
Angerdetta	Gudlacullagoda ..	0 15 39 D				
Arrakerrabetta	Adonidroog	0 8 49 D	15 10	1/7	Adonidroog .	2108
Adondroog	Arrakerrabetta	0 1 47 D				
Mulliabad	Adonidroog	0 17 2 D	23 40	1/13	Malliabad .	1844
Do.	Kotipilly	0 6 38 D		1/4		
Malliabad	Kotipilly	0 12 3 D	29 10	1/4	Kotepilly .	1657
Kotipilly	Malliabad	0 2 6 D				
Do.	Darroor	0 5 D	19 35	1/4	Darroor hill .	1863
Darroor hill	Malliabad	0 8				
Darroor hill	Inpahgutt	0 0 D	29 37	1/5	Inpahgutt .	2500
Inpahgutt	Darroor hill	0 21				
Poolycondah	Poolycondah					
Poolycondah	Koolecondah		8 56	1/5	Poolycondah .	1931
Koolecondah	Kotipilly					
Kotipilly	Kotipilly					
Kotipilly	Kotipilly					
Kotipilly

21. Tables of Degrees Meridional, Perpendicular, and Longitudinal, from the Equator to the Poles.

MERIDIONAL DEGREES.

Latitudes	Degrees.	Latitudes	Degrees.	Latitudes.	Degrees.
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
0	[illegible]	31	60615.5	62	60924.5
1	[illegible]	32	60623.8	63	60933.1
2	[illegible]	33	60635.2	64	60941.4
3	[illegible]	34	60644.8	65	60949.5
4	[illegible]	35	60651.5	66	60957.5
5	[illegible]	36	60664.4	67	60965.3
6	[illegible]		60674.3	68	60972.7
7	[illegible]	37	60681.[illegible]	69	60979.9
8	[illegible]	38	60[illegible]5.5	70	60986.7
9	[illegible]	39	60[illegible]3.8	71	60993.4
10	[illegible]	40	60715.1	72	60999.7
11	[illegible]	37 2	60725.1	73	61005.7
12	[illegible]	42	60735.8	74	61011.5
13	[illegible]	41	6 [illegible]16.3	75	61016.8
14	[illegible]	45	60756.7	76	61022.0
15	[illegible]	46	6 767.2	77	61025.7
16	[illegible]	47	6[illegible]777.6	78	61031.2
17	[illegible]	48	60788.0	79	61035.3
18	[illegible]	49	6[illegible]798.4	80	61039.1
19	[illegible]	50	60808.7	81	61042.5
20	60824.2	51	60819.0	82	61045.6
21	6083[illegible].0	52	60829.2	83	61048.3
22	60512.0	53	60839.3	84	61050.7
23	60849.1	54	6[illegible]819.3	85	61052.7
24	60857.0	55	6 859.3	86	61054.3
25	60864.8	56	60869.0	87	61055.6
26	60872.9	57	60878.7	88	6 [illegible]56.5
27	60881.9	58	6 888.2	89	61057.1
28	60889.7	59	60897.5	90	61 [illegible]25
29	6 [illegible]98.4	60	6[illegible]06.7		
30	60907.4	61	60915.7		

PERPENDICULAR DEGREES.

Latitudes.	Degrees.	Latitudes.	Degrees.	Latitudes.	Degrees.
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
0	60857.05	10	60863.0	20	60881.1
1	60857.1	11	60864.3	21	60882.7
2	60857.3	12	60865.7	22	60885.0
3	60857.6	13	60867.1	23	60887.5
4	60858.0	14	60868.7	24	60890.0
5	60858.6	15	60870.4	25	60892.7
6	60859.2	16	60872.2	26	60895.4
7	60860.0	17	60874.1	27	60898.2
8	60860.9	18	60876.1	28	60901.
9	60861.9	19	60878.2	29	60903.9

PERPENDICULAR DEGREES.—*Continued.*

Latitudes.	*Degrees.*	*Latitudes.*	*Degrees.*	*Latitudes.*	*Degrees.*
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
30	60905.2	52	60981.1	74	61042 0
31	60910.0	53	60984 5	75	61043.8
32	60913.1	54	60987.9	76	61045 5
33	60916.2	55	60991.2	77	61047.1
34	60919.4	56	60994.4	78	61048.5
35	60922.7	57	60997.6	79	61049 9
36	60926.0	58	61000.8	80	61051.2
37	60929.3	59	61004.0	81	61052.3
38	60932 7	60	61007.0	82	61053.4
39	60936 4	61	61010 0	83	61054.3
40	60939.5	62	61012.9	84	61055.1
41	60943 02	63	61015.8	85	61055 7
42	60946 4	64	61018.6	86	61056.3
43	60949.9	65	61021.3	87	61056 7
44	60953.4	66	61024.0	88	61057.0
45	60956.9	67	61026.6	89	61057.2
46	60960.4	68	61029.0	90	61057.35
47	60963 9	69	61031.4		
48	60967.4	70	61033.7		
49	60970.8	71	61035 9		
50	60974.3	72	61038 0		
51	60977.7	73	61040.1		

LONGITUDINAL DEGREES.

Latitudes.	*Degrees.*	*Latitudes.*	*Degrees.*	*Latitudes.*	*Degrees.*
	Fathoms.		Fathoms.		Fathoms.
°		°		°	
0	60887.05	31	52210.0	62	28643.8
1	60847.8	32	51657.2	63	27760.6
2	60840.2	33	51088.6	64	26748.8
3	60774.2	34	50504.3	65	25788.7
4	60709 8	35	49904.9	66	24820.7
5	60637.0	36	49290.2	67	23845 0
6	60556 8	37	48660.3	68	22861.9
7	60466.4	38	48015.6	69	21871.7
8	60368.6	39	47356.2	70	20874.6
9	60112.6	40	46683.4	71	19871.4
10	59938.4	41	45994.2	72	18861.8
11	59746 1	42	45292.0	73	17846.4
12	59535.6	43	44576.0	74	16825 4
13	59307.2	44	43846.2	75	15799.2
14	59060.6	45	43103.0	76	14768.2
15	58796.3	46	42346 8	77	13732.6
16	58514 1	47	41577.3	78	12692 7
17	58214.2	48	40795.1	79	11648.9
18	57896.6	49	40000.5	80	10601.4
19	57561.4	50	39193.6	81	9550.7
20	57208 8	51	38374.5	82	8497.0
21	56838 9	52	37543.7	83	7440.6
22	56451 6	53	36701.4	84	6382.0
23	56047.2	54	35847.8	85	5321.4
24	55625.8	55	34983.1	86	4259.1
25	55187.5	56	34107.6	87	3195.5
26	54732 4	57	33221.7	88	2130.9
27	54260.6	58	32325 5	89	1065.6
28	53772 4	59	31419.4	90	
29	53267.8	60	30503.5		
30	52746.9	61	29578.2		

The foregoing Tables of Degrees are computed from the formula given in Articles 3d, 7th and 8th, of the Appendix in page 90, Vol. 12th, Aſiatick Reſearches, where

m = The degree in latitude l

p = The perpendicular degree } On the Equator where $p = d$

d = The degree of longitude }

m = The degree on the meridian }

p = The perpendicular degree } In any other latitude l

d = The degree of longitude }

1 = The polar axis

$1 + e$ = The equatorial diameter

Then $m = m \frac{\sqrt{\text{Cos.}^2 l . (1+e)^2 + \text{Sin.}^2 l}^3}{\sqrt{\text{Cos.}^2 l . (1+e)^2 + \text{Sin.}^2 l}^3}$

$$p = \frac{p(1+e)}{\sqrt{\text{Cos.}^2 l . (1+e)^2 + \text{Sin.}^2 l}}$$

$$d = \frac{d(1+e)}{\sqrt{(1+e)^2 + \tan.^2 l}}$$

In which (ſee Art. 19.) $m = 60491.4$; $l = 13\ 34\ 44''$ p or $d = 60857.05$ fath. and $1 + e = 1.0032896$.

22. Latitudes and Longitudes of all the great stations, and principal places deduced from the Meridional Arc, including those formerly given; the whole being computed from the scale of degrees given in Art. 21.

NAMES OF PLACES.	Countries and Provinces	Latitudes.	Longitudes from Madras observ.	Longitudes from Greenwich
		° ′ ″	° ′	° ′
Pullum, Christian Church	Travancore	N 8 5 17	E 2 49	W 77 29 30
Munnacun, Christian Church	Travancore	N 8 5 26	2 48 11	77 32 19
Kodejeonttum,	Travancore	N 8 8 9	2 56 8	77 22 25
Kootapoodi, Christian Church	Travancore	N 8 8 53	2 39 8	77 39 22
Sheranttam, pagoda,	Travancore	N 9 9 23	2 37 14	77 31 16
Punnae,	Travancore	N 9 9 38	2 37 39	77 40 51
Pillikolum, Christian Church	Travancore	N 9 9 44	2 25 37	77 42 53
Kovar, Christian Church	Travancore	N 10 5	2 48 52	77 29 38
Koodunkolum,	Travancore	N 8 10 36	2 34 31	77 43 39
Kootachy, Christian Church	Travancore	N 10 43	3 0 45	77 17 45
Naugarcoil, Barrack gate	Travancore	N 8 11 14	2 49 24	77 29 8
Oodagherry, Flag Staff	Travancore	N 8 14 37	2 54 51	77 23 39
Arambully, hill and pagoda	Travancore	N 8 18 2	2 44 22	77 34 8
Munpothu,	Travancore	N 8 16 3	2 40 36	77 37 54
Oodagherry hill,	Travancore	N 8 16 11	2 53 57	77 21 33
Anjarcanarug,	Travancore	N 8 16 53	3 0 35	77 17 55
Red hills,	Travancore	N 8 22 40	2 22 52	77 55 38
Commo in Peak,	Travancore	N 8 23 10	2 43 58	77 34 37
Miandraghery	Travancore	N 8 23 10	2 45 50	77 32 40
Rajakan ungum hill, (mark)	Travancore	N 8 26 7	2 35 16	77 43 14
Trivanderam, pagoda	Travancore	N 8 29 3	3 18 31	76 59 59
Nagarancherry, pagoda	Travancore	N 8 29 35	2 36 42	77 42 48
Tirchundoor, pagoda	Travancore	N 8 29 51	2 7 27	78 11 3
Kunnimapoha,	Travancore	N 8 30 29	2 37 49	77 40 41
Kalecad Fort, pagoda	Travancore	N 8 31 3	2 42 7	77 36 23
Perrandapotha, mark	Travancore	N 8 31 26	2 39 38	77 39 27
Sree vigundram pagoda	Travancore	N 8 37 58	2 20 33	77 57 57
Coonamoor hill	Travancore	N 8 41 53	2 31 48	77 43 42
Vultanand hill	Travancore	N 8 42 56	2 22 5	77 56 25
Pattomcottah, Flag Staff	Travancore	N 8 43 32	2 30 57	77 47 33
Tinnivelly, pagoda	Tinnivelly	N 8 43 47	2 33 51	77 44 39
Mallpettam hill, pagoda	Tinnivelly	N 8 45 33	2 28 53	77 49 37
East of the base,	Tinnivelly	N 8 46, 22	2 31 33	77 46 57
West end of the base,	Tinnivelly	N 8 47 7	2 36 31	77 41 56
Putacorin, Flag Staff	Travancore	N 8 48 3	2 16 13	78 2 17
Vadamkari hill	Tinnivelly	N 8 48 28	2 37 46	77 40 44
Tevanoottha,	Tinnivelly	N 8 49 2	2 31 47	77 46 43
Woragodiarum, pagoda	Tinnivelly	N 8 54 57	2 13 54	78 4 36
Kolancilloor hill,	Tinnivelly	N 8 55 40	2 16 17	78 2 13
Parlyamcoorchy, (gateway)	Tinnivelly	N 8 56 14	3 2 14	77 16 16
Vengaur, Christian Church	Tinnivelly	N 9 0 47	1 58 47	78 19 43
Vengaur station	Tinnivelly	N 9 1 32	2 0 19	78 18 11
Vembaur, Christian Church	Tinnivelly	N 9 5 0	1 53 24	78 25 6
Mar tpoor, hollving	Tinnivelly	N 9 6 58	1 50 7	78 28 23
Mookoor, Christian Church	Tinnivelly	N 9 7 54	1 46 24	78 32 6
Yettamcottam, palace	Tinnivelly	N 9 8 59	2 15 20	78 3 10
Shungarnaroil, pagoda	Tinnivelly	N 9 10 19	2 43 12	77 35 18
Perrinormalli,	Tinnivelly	N 9 12 23	2 45 28	77 33 2
Meenachipooram,	Tinnivelly	N 9 12 40	2 16 26	78 2 5
Chungoo Chou try,	Ramnad	N 9 14 59	1 24 32	78 53 58
Periapatam,	Ramnad	N 9 15 7	1 20 39	78 57 51
Ramaswamy Chaultry,	Ramnad	N 9 15 54	1 11 31	79 6 59
Monthoopett, Christian Church	Ramnad	N 9 16 14	1 19 58	78 58 32
Vaidauly,	Ramnad	N 9 16 30	1 8 38	79 9 52

NAMES OF PLACES.	Countries and Provinces.	Latitudes.	Longitudes from Madras observ.	Longitudes from Greenwich.
		° ′ ″	° ′ ″	° ′ ″
Tirroopolany, pagoda	Ramnad.	9 17 2	1 25 37 W.	78 52 52 E
Kunjikauten hill,	Tinnivelly.	9 17 6	2 40 11	77 38 19
Ramisseram, pagoda	Ramnad.	9 18 12	0 56 44	79 21 46
Tirroovutumunga, pagoda	Ramnad.	9 19 1	0 30 48	78 47 42
Ramnad palace,	Ramnad,	9 22 18	1 25 31	78 52 59
Kootesapaurae hill,	Ramnad.	9 28 54	2 14 36	78 3 54
Shevelipootoor pagoda,	Tinnivelly.	9 30 37	2 37 13	77 41 17
Gopaulswamy hill, pagoda	Tinnivelly.	9 32 25	2 27 15	77 51 15
Toomichinaig pettah, pagoda	Madura.	9 44 11	2 27 51	77 50 39
Suddragherry hill,	Madura.	9 44 27	2 34 34	77 43 56
Sekuedermalli,	Madura.	9 52 39	2 11 0	78 7 30
Madura Fort, pagoda	Madura.	9 55 16	2 7 56	78 10 34
Nagamalli,	Madura.	10 0 2	2 18 56	77 59 34
Risheemalli,	Madura.	10 12 36	2 22 14	77 55 16
Permaul hill,	Coimbetoor.	10 18 2	2 41 19	77 37 11
Dindigul flag staff,	Madura.	10 21 39	2 17 23	78 1 7
Pyney hill, pagoda	Coimmetoor.	10 26 23	2 43 58	77 34 32
Virpachy hill, pagoda	Coimbetoor.	10 28 39	2 31 26	77 47 4
Jainkul droog	Coimbetoor.	10 35 2	2 20 27	77 58 3
Kurroomalli,	Madura.	10 35 28	2 22 41	77 55 49
Rungamalli,	Coimbetoor.	10 38 58	2 20 10	77 58 20
Parteemalli,	Coimbetoor.	10 40 4	2 30 34	77 37 56
Darapooram, highest cavalier,	Coimbetoor.	10 44 35	2 43 12	77 25 18
Cheerjatee hill, pagoda	Coimbetoor.	10 49 48	3 3 34	77 14 56
Dodoormalli,	Coimbetoor.	10 53 12	2 44 3	77 34 27
Nandkannee hill,	Coimbetoor.	10 53 59	2 38 10	77 40 20
Kautpolliam,	Coimbetoor.	10 56 44	2 34 29	77 44 8
Parmatty hill,	Coimbetoor.	10 58 33	2 19 50	77 58 40
Payroor, pagoda	Coimbetoor.	10 58 37	3 20 15	76 58 15
Coimbetoor, palace	Coimbetoor.	10 59 42	3 17 54	77 0 36
Putchapolliam,	Coimbetoor.	10 59 48	2 37 47	77 40 43
Hallagamalli, pagoda,	Coimbetoor.	11 0 54	2 48 53	77 29 37
Shevamalli, pagoda	Coimbetoor.	11 2 12	2 42 54	77 35 36
Shevanimpunty, (building)	Coimbetoor.	11 5 42	3 14 32	77 3 58
Wookulee hill, pagoda	Coimbetoor.	11 10 42	2 48 24	77 30 6
Yaclmaroor hill,	Coimbetoor.	11 12 8	2 30 13	77 48 17
Arsanamalli,	Coimbetoor.	11 12 12	2 44 33	77 34 57
Namcul droog, (tree near Mosque,)	Salem.	11 13 24	2 6 14	77 13 16
Vizianunglum, pagoda	Coimbetoor.	11 15 1	2 48 59	77 33 31
Aranghorry, pagoda on rock	Salem.	11 15 17	2 20 7	77 58 23
Ninahmalli, pagoda	Salem.	11 19 16	2 2 57	78 15 43
Enrode Fort, S. East cavalier	Coimbetoor.	11 20 29	2 31 37	77 46 53
Thittamalli,	Coimbetoor.	11 20 54	2 53 47	77 24 43
Irrumberrae hill, pagoda	Coimbetoor.	11 21 53	3 9 55	77 8 35
Turchankode hill, pagoda	Salem.	11 22 32	2 21 1	77 17 29
Yellatoor, pagoda	Coimbetoor.	11 22 58	2 37 39	77 2 51
Bikarany, pagoda	Coimbetoor.	11 25 48	2 34 19	77 44 11
Gopachetty pollium hill, pagoda	Coimbetoor.	11 27 0	2 48 25	77 30 5
Woorachum hill, pagoda	Coimbetoor.	11 28 39	2 39 44	77 44 46
Sankerry droog	Salem.	11 28 52	2 23 42	77 54 48
Sattimunglum, pagoda	Coimbetoor.	11 30 18	3 0 39	77 17 55
Mullaikerrue peak pillar	Salem.	11 35 13	1 45 21	78 33 9
Mallisman droog,	Coimbetoor.	11 35 15	2 55 16	77 23 14
Kumbeearine hill,	Coimbetoor.	11 35 23	2 58 54	77 19 36
Alungasandrum, pagoda	Salem.	11 40 24	2 19 24	78 5 6
Pantamalli,	Coimbetoor.	11 41 41	2 31 1	77 47 29
Thanrarmunglum, pagoda	Salem.	11 41 47	2 16 57	78 1 33

NAMES OF PLACES.	Countries and Provinces.	Latitudes.	Longitudes from. Madras obser.	Longitudes from. Greenwich.
			° ′ ″	° ′ ″
*Womooloor Fort, cavalier	Coimbetoor.	11 48 10	2 12 51 W.	78 5 30 E.
*Ponnasmalli,	Coimbetoor.	12 8 50	2 36 27	77 42 3
*Bundkully droog,	Coimbetoor.	12 12 18	2 54 59	77 23 31
Gopauldroog,	Mysoor.	12 20 56	2 57 29	77 21 1
*Deorabetta,	Mysoor.	12 37 35	2 37 35	77 40 55
Moodawaddie droog,	Mysoor.	12 41 0	2 48 36	77 29 54
Annicul Fort, pagoda	Mysoor.	12 42 37	2 33 31	77 44 59
Oossoor hill, pagoda	Mysoor.	12 43 37	2 24 53	77 53 37
*Bonnaitgottah hill,	Mysoor.	12 48 46	2 40 40	77 37 50
Timmaroyah N. E. ∠ of Fort,	Mysoor.	12 50 31	2 37 26	77 41 2
Bangalore, palace	Mysoor.	12 57 37	2 40 44	77 37 46
*Dodagoondah,	Mysoor.	13 0 4	2 37 40	77 40 50
*Muntapum,	Mysoor.	13 0 48	2 40 13	77 38 17
*Tirtapully hill,	Mysoor.	13 2 23	2 21 58	77 56 32
Bonnapooram hill,	Mysoor.	13 3 33	2 45 47	77 32 43
Ooscottah Eedgah,	Mysoor.	13 4 24	2 28 13	77 50 17
Deonelly Fort,	Mysoor.	13 15 3	2 32 39	77 45 51
Koondana hill, pagoda	Mysoor.	13 15 36	2 37 20	77 41 10
B. Ballapoor, Eedgah	Mysoor.	13 17 49	2 43 12	77 35 18
*Cheetkul hill,	Mysoor.	13 19 20	2 58 50	77 19 40
*Kulkotah hill,	Mysoor.	13 25 18	2 39 8	77 39 22
Mackly droog, (pagoda.)	Mysoor.	13 26 2	2 45 3	77 33 27
Rungaswamy hill, pagoda	Mysoor.	13 28 3	2 42 13	77 36 11
Goodeebundah droog, pagoda	Mysoor.	13 40 38	2 33 4	77 45 26
Baggapilly N. E. angle of the Fort,	Mysoor.	13 47 13	2 27 14	77 51 16
Koadicondah droog, remark. stone,	Ced. Districts.	13 49 54	2 28 25	77 50 5
*Yerracondah,	Mysoor.	13 55 3	2 36 5	77 42 25
*Bomasundrum,	Mysoor.	13 59 44	2 46 30	77 32 0
*Paughur,	Mysoor.	14 6 23	2 58 31	77 19 59
*Ooracondah,	Ced. Districts	14 15 51	2 38 44	77 39 46
Durmaweram, great building,	Ced. Districts	14 24 35	2 31 49	77 46 41
Kunnagunpilly, hill pagoda	Ced. Districts.	14 26 58	2 44 8	77 34 22
*Condapilly hill,	Ced. Districts.	14 31 57	2 50 58	77 27 32
*Davurcondah,	Ced. Districts.	14 40 37	2 36 15	77 42 15
Annantapoor Fort,	Ced. Districts.	14 40 58	2 38 39	77 39 51
*Oodurpeedroog,	Ced. Districts.	14 49 58	2 54 29	77 24 1
*Paumdy hill,	Ced. Districts.	14 57 55	2 40 16	77 38 14
*South end of the base,	Ced. Districts.	15 0 58	2 36 25	77 42 5
Wudjar Carroor,	Ced. Districts.	15 1 45	2 52 5	77 26 25
*Boglemsuricondah,	Ced. Districts.	15 4 56	2 45 6	77 33 24
*North end of the base,	Ced. Districts.	15 5 53	2 38 43	77 39 47
*Namthabad,	Ced. Districts.	15 6 0	2 38 46	77 39 44
*Konakoondloo hill,	Ced. Districts.	15 6 43	2 53 2	77 25 28
*Gonty droog, flag staff	Ced. Districts.	15 6 53	2 36 8	77 42 22
Guddaculgoodu, pagoda	Ced. Districts.	15 7 23	3 0 48	77 17 42
*Bokeecondah,	Ced. Districts.	15 10 46	2 44 13	77 34 17
Mokay high cavalier,	Ced. Districts.	15 14 5	3 11 36	77 6 54
Pasepilly droog platform,	Ced. Districts.	15 14 8	2 30 38	77 47 52
Muddigherry, pagoda	Ced. Districts.	15 15 7	2 50 15	77 28 15
*Goodurhoor,	Ced. Districts.	15 18 54	3 15 43	77 2 47
*Koelacondah,	Ced. Districts.	15 10 24	2 38 37	77 39 53
Gooleum, (turret)	Ced. Districts.	15 21 17	3 11 41	77 6 49
Sunnygoondloo, pillar	Ced. Districts.	15 22 3	2 33 20	77 45 10
*Putticondah,	Ced. Districts.	15 23 4	2 44 30	77 33 51
*Kurrakerra-betta,	Ced. Districts.	15 24 38	3 3 52	77 14 28

NAMES OF PLACES.	Countries and Provinces.	Latitudes.	Longitude from Madras observ.	Longitude from Greenwich.
		° ′ ″	° ′ ″	° ′ ″
Narsniky droog, turret	Ced. Districts.	15 28 14	2 5 43 W	77 12 47 E.
Pochyeondah,	Ced. Districts.	15 28 16	2 39 17	77 39 13
Holelgoondah,	Ced. Districts.	15 30 6	3 12 51	77 5 39
Darungeondah,	Ced. Districts.	15 32 8	2 42 6	77 36 24
Kotacul hill,	Ced. Districts.	15 34 11	2 56 32	77 21 58
Tarnacul hill,	Ced. Districts.	15 38 25	2 43 27	77 35 3
Adonidroog, buildjog	Ced. Districts.	15 38 53	2 58 30	77 20 0
Goodicul betta,	Ced. Districts.	15 44 44	2 47 29	77 31 1
Buddah Toomul, pagoda	Ced. Districts.	15 45 54	2 59 31	77 18 59
Jaggarnaut,	Kurnool.	15 45 58	2 13 14	78 5 16
Chinna Toomul, turret on hill	Ced. Districts.	15 47 30	2 56 41	77 21 49
Kaumingutt,	Ced. Districts.	15 48 42	2 58 21	77 20 9
Kerrae Bellagul,	Ced. Districts.	15 48 50	2 34 14	77 44 16
Kurnool Fort, Laul Battery	Kurhool.	15 49 58	2 12 10	78 6 20
Koraegy hill,	Ced. Districts.	15 51 11	3 0 36	77 17 54
Ruler Bellagul,	Ced. Districts.	15 52 21	2 57 17	77 21 13
Rajavelly, pagoda	Dooab.	15 52 58	2 26 27	77 51 53
Nanguldinny, pagoda	Ced. Districts.	15 54 59	2 41 6	77 37 24
Mandaveram,	Ced. Districts.	15 57 20	2 58 10	77 20 20
Koodally Soogum, pagoda	Kurnool.	15 57 56	2 0 11	78 18 19
Toonga Buddah, turret	Dooab.	15 58 26	2 57 54	77 20 36
Tunnacul hill, pagoda	Doaab.	15 58 34	2 31 3	77 47 27
Gutt Bichallae,	Doaab.	15 59 27	2 56 43	77 21 47
Moorycondah, N. E. angle	Kurnool.	16 0 42	1 59 53	78 18 57
Peddacoorva hill,	Kurnool.	16 1 5	1 46 56	78 31 34
Pauktoor Fort, N. W. angle	Doaab.	16 1 23	2 11 41	78 6 49
Pauktoor Eedgah,	Doaab.	16 1 43	2 12 4	78 6 26
Marra Moonigalla,	Nizam.	16 2 0	2 12 42	78 5 48
Y Hacondah,	Nizam.	16 5 0	2 9 37	78 8 53
Malliabad,	Doaab.	16 8 15	2 54 6	77 24 24
Anountapooram hill, pagoda	Doaab.	16 11 54	2 23 14	77 54 16
Rachoor droog, building	Doaab.	16 12 1	2 54 10	77 24 20
Yaetumcondah,	Nizam.	16 13 37	1 58 29	78 20 1
Darroor hill,	Doaab.	16 13 42	2 35 36	77 42 54
Shaikapoor hill,	Nizam.	16 13 49	2 19 16	77 59 14
Geddawal pagoda	Doaab.	16 14 16	2 27 10	77 51 20
Panugul droog,	Nizam.	16 14 59	2 7 17	78 11 13
Mavehede Fort,	Doaab.	16 16 33	2 57 6	77 21 24
Chanderragudda droog pagoda	Doaab.	16 23 21	2 32 20	77 46 10
Narrawah Mosque,	Nizam.	16 26 14	2 34 43	77 43 47
Balchacker peak,	Nizam.	16 40 57	2 59 12	77 19 18
Gurromuttee,	Nizam.	16 27 5	2 41 42	77 53 48
Kotapilly hill,	Nizam.	6 28 27	2 52 14	77 26 16
Mucktul Eedgah,	Nizam.	16 29 54	2 45 16	77 33 14
Mucktul, pagoda	Nizam.	16 29 50	2 44 10	77 34 20
Kuddasoor Mosque,	Nizam.	16 31 6	2 55 23	77 23 7
Ghumpoora droog,	Nizam.	16 33 50	2 11 49	78 6 41
Ootkoor Fort, cavalier	Nizam.	16 39 4	2 44 27	77 34 3
Inpahgutt,	Nizam.	16 42 39	2 36 0	77 42 30
Koilkondah droog pagoda	Nizam.	16 44 48	2 27 36	77 50 54
Yategheir droog,	Nizam.	16 45 56	3 6 47	77 11 43
Naramapettah (domb)	Nizam.	16 46 10	2 45 34	77 32 56
Kandakoor hill,	Nizam.	16 47 34	2 51 53	77 23 37
Goodda Metticul Eedgah,	Nizam.	16 51 37	2 52 9	77 6 21
Kaunkoortee,	Nizam.	16 54 35	2 47 27	77 31 3
Pochamahgutt,	Nizam.	16 57 41	2 19 2	77 59 29
Kota Kuddangul,	Nizam.	17 8 4	2 36 47	77 4 13
Purgy hill,	Nizam.	17 12 39	2 20 49	77 [illegible] 4

NAMES OF PLACES.	Countries and Provinces.	Latitudes.	Longitudes from. Madras observ.	Longitudes from. Greenwich.
* Annantagherry hill, ...	Nizam.	17 18 35	2 23 54 W.	77 54 36 E.
Yeggoo Maumdy Mosque, ...	Nizam.	17 24 57	2 19 30	77 59 0
Nagareddyhilly, ...	Nizam.	17 26 11	2 19 20	77 59 10
Topecondah hill, pagoda	Nizam.	17 30 27	2 10 6	78 8 24
* Kotamarpilla hill, ...	Nizam.	17 30 32	2 27 9	77 51 21
* Topecondah hill, ...	Nizam.	17 30 43	2 10 55	78 7 35
Nuckulgurt hill, ...	Nizam.	17 32 18	2 21 3	77 57 27
Rajenpet building, ...	Nizam.	17 37 50	2 9 56	78 8 34
Gobleveram, Fort N. W.	Nizam.	17 39 21	2 23 32	77 54 58
* Goraegut hill, ...	Nizam.	17 39 43	2 24 57	77 53 33
Gopencilly, pagoda	Nizam.	17 40 37	2 43 52	77 34 38
* Sheela hilly, ...	[illegible]	17 46 20	2 35 9	77 43 21
* Tandmunnoor, ...	Nizam.	17 48 28	2 17 14	78 1 16
Jogymant hill, pagoda	Nizam.	17 [illegible] 18	2 10 36	78 7 54
Mutrallee, remarkable tree, ...	Nizam.	17 [illegible] 57	2 8 3	78 [illegible] 7
* Malliga hill, ...	Nizam.	17 [illegible]	[illegible] 38 47	77 [illegible]
Palmerand, turret	Nizam.	17 [illegible]	[illegible]	77 [illegible]
Beder Mosque, high minater, ...	Nizam.	17 4	[illegible]	[illegible]
* Doodallah, ...	Nizam.	17 56 7	[illegible]	[illegible]
Chilleriga Fort, ...	Nizam.	17 57 38	[illegible]	77 51 [illegible]
Kauramoongy Fort, ...	Nizam.	18 1 30	2 39 [illegible]	77 39 8
* East end of the base, ...	Nizam.	18 2 46	2 34 52	77 44 [illegible]
* West end of the base, ...	Nizam.	18 3 24	2 40 8	77 38 22
* Daumergidda, ...	Nizam.	18 3 24	2 3[illegible] 9	77 43 [illegible]

Note.—All places marked with the arterisk (*) are great stations.

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II.

On the existence of the Hindu religion in the island of Bali.

By JOHN CRAWFURD, Esq.

THE *Hindu* religion, which was at one time extensively ſpread throughout the oriental *Archipelago*, and conſtituted the belief of all the tribes which had emerged from barbariſm, or made any progreſs in ſocial order, now exiſts only on the iſland of *Bali*, as the predominant religion.

THAT the *Hindu* religion ſtill prevailed on *Bali* is a fact which has been long known; but I am not aware that any preciſe information has been made public on this curious and intereſting ſubject. I ſhall endeavour to ſupply the deficiency, as well as my own narrow experience and my want of previous preparation for ſo difficult a taſk will enable me. The details which I am about to lay before the *Asiatic* Society are chiefly the reſults of my own enquiries on the iſland; and were ſupplied to me through the liberality of the elder prince of *Blelling*, who omitted no opportunity of gratifying my curioſity. He cauſed ſome of the moſt intelligent *Brahmens* to be ſummoned to ſupply me with the information required; and with great cheerfulneſs and good humour ſupplied himſelf the place of an intrepreter, for

which a reſpectable acquaintance with the *Malay* language rendered him perfectly competent. To the honor of all the parties concerned, I muſt obſerve, that I met with the moſt perfect candour and openneſs, without the leaſt impatience or reſerve; on the contrary, an anxious deſire to gratify my curioſity; and even a ſatisfaction diſplayed at the intereſt apparently taken in what ſo nearly concerned them. Religious intolerance, indeed, is a vice far removed from the diſpoſitions of the inhabitants of all theſe iſlands, whether *Mahomedan* or *Hindu*.

When interrogated reſpecting their religion, the natives of *Bali* ſay, that they are of the religion of Siva, (*Agama Siva*), or of the religion of Buddha, (*Agama Buddha*); but as almoſt all knowledge of their religion is confined to its miniſters, whoſe opinions and doctrines the people ſupinely ſubſcribe to, it is uſual to ſay. "the religion of the *Brahmans* of Siva," and "the religion of the *Brahmans* of Buddha," inſtead of more general appellations.

It is of the *Hinduiſm* of the ſect of Siva only, that I can furniſh any detailed information. The *Buddhiſts* are few in number. In the territories of the family of *Karang-aſſam*, conſtituting perhaps not leſs than one half of the iſland, there were but three ſmall diſtricts chiefly occupied by the worſhippers of Buddha and theſe were diſtant from the part of the iſland which I viſited. The name of one of theſe diſtricts is worth mentioning, for the inference which may be drawn from it. It is called *Deſa Buddha Kling*, which means the country of the *Buddhiſts* of *Kalinga*.

The followers of Siva ſpoke of theſe of Buddha more with contempt than hatred or rancour—the laſt, indeed, are feelings not likely to be entertained by any people for a fallen ſect; in which light the *Buddhiſts* were evidently looked upon. The *Brahmans* in their converſa-

tion often let fall expreſſions, which ſhewed that they entertained no reſpect whatever for the followers of the oppoſite worſhip. The ſect of SIVA may indeed be denominated the national religion. It is the religion of nine-tenths of the people, of every ſovereign on the iſland, and of every man in power.

THE followers of SIVA on *Bali* are as in weſtern *India* divided into four great claſſes or caſts, viz. a prieſthood, a ſoldiery, a mercantile claſs, and a ſervile claſs, reſpectively thus denominated; *Brahmana*, *Satriya*, *Wiſiya* and *Sudra*. Making due allowance for the imperfection of the alphabets in uſe among the tribes of the oriental iſlands, I believe theſe terms will not be found to differ much from the original orthography; an obſervation which as far as I can judge, applies to the numerous claſs of words introduced from the *Sanſkrit*. The following origin of the caſts was diſtinctly ſtated by the *Brahmans*. "The god BRAHMA produced the *Brahmana* from his mouth, which imports wiſdom; the *Satriya* from his cheſt, which imports ſtrength and government; the *Wiſiya* from the abdomen, which implies that it is his buſineſs to furniſh ſubſiſtence for the ſociety; and the *Sudra* from the feet, which implies that he is deſtined to obedience and ſervitude." The *Brahmans* made this ſtatement without my having put any queſtion that could lead to it; for which reaſon it is that I repeat what to the *Hindu* ſcholar muſt have the appearance of mere common place. The inſtitution of the caſts is termed by the *Baline/e*, *Chator jalma*.

THE *Brahmans* are held in high reſpect; they will not condeſcend to act with any inferior claſs. It is held unworthy of a *Brahman* to humble himſelf before any individual; and he will hardly deign to make a common obeiſance even to his prince. To ſit on the ground is derogatory to his rank. To ſupercede the neceſſity of his doing ſo, I obſerved that at *Bhelling* in the apartment where the *Laja* received us, there was conſtructed a permanent ſeat well raiſed

from the ground; on which the *Brahmans* ranged themſelves. In the audience chamber of every Raja I was given to underſtand that there was a ſimilar ſtructure. The perſon of a *Brahman* is held inviolable; and hardly any circumſtance of aggreſſion on his part will warrant taking his life.

The common claſſes cut the hair ſhort in the ſame way that the *Siameſe* do. The *Brahmans* alone wear it long, tying it as the *Hindus* of weſtern *India* do, in a knot behind the head. From this circumſtance it was no difficult matter to diſtinguiſh them. In a ſuperior regularity of features, and the abſence of the flat and often unmeaning lines of the *Malay* viſage, I imagined, with others of my countrymen, that their *Indian* origin, could eaſily be traced. This will be thought the leſs improbable when it is recollected that the preſent generation is but the tenth removed from the firſt ſtock that ſettled on the iſland. The ſuperior claſſes may take concubines from the inferior: but the oppoſite practice is ſtrictly interdicted. The offſpring of ſuch unions, as in continental *India*, forms a variety of new caſts. A legal marriage, however, can be contracted only between perſons of equal rank, ſo that the four great claſſes are in this manner preſerved diſtinct.

Among the *Hindus* of *Bali* as well as in *India*, there exiſts a claſs of outcaſts called as there *Chaṅḍála*. Theſe are held impure, and being excluded from aſſociating with their fellow ſubjects, occupy the outſkirts of the village. Potters, dyers, dealers in leather, diſtillers, and retailers of ardent ſpirits, are of this order.

Hitherto I have deſcribed practices and inſtitutions nearly parallel with thoſe of *India*; but there are others, to judge from which, the natives of *Bali* would hardly deſerve the name of *Hindus*, in our appreciation of the cuſtoms and habits, which ought to be aſcribed to the latter,

THE ſingular prejudies of the *Hindus* of Continental *India* on the ſubject of food, are either qualified in practice; or altogether neglected by thoſe of *Bali*. The lower claſſes are by no means punctilious on the ſubject of diet; and the *Brahmans* who alone attend to diſtinctions of this kind, reſpect them with ſuch modifications, as render their obſervances very wide of the *Indian* practice, as far as my limited acquaintance with both will enable me to judge.

THE *Balineſe* venerate the cow: but they aſſign as the reaſon for paying no peculiar honors to the common breed found on their own iſland, that it is not the one which their religion commands them to reſpect. The breed of oxen found on *Bali* is of the wild ſpecies, uſually called *Benteng* by the natives of these iſlands. It is of a remarkably large ſize, and fit for any purpoſe of agriculture, but wants the hump which characterizes the *Indian* cow; and which would ſeem neceſſary to entitle the animal to ſanctity. On *Java*, I have ſeen many images of the *Bull Nandi*, the vehicle of MAHADEVA, with an enormous hump, evidently ſhowing that the ordinary cattle of theſe countries did not afford the models from which ſuch ſculptures were made. The Raja of *Blelling* expreſſed a great deſire to have one of the *Indian* breed, and wrote me to this effect on my return to *Java*. I had the ſatisfaction to procure a white bull and cow of the *Gujrat* breed, which were ſent to *Bali*, and reached the Raja in ſafety.

THE ordinary ox of *Bali* is decidedly held in no reſpect; for the inferior claſſes eat beef without ſcruple. The Raja ſupplied our troops with abundance of cow beef in preference to that of the buffalo, which is more eſteemed among the *Balineſe*. The cattle were ſlaughtered on the beach within a few yards of the houſe where the Raja reſided; and this without offering violence to his own prejudices, or thoſe of any claſs of his ſubjects.

THE *Brahmans* indeed abſtain from eating beef and every ſpecies of animal food whatever. Their diet is purely vegetable: they even ſometimes go ſo far as to refrain from eating rice or other farinaceous grain, confining their diet to roots and fruits. Neither milk nor any preparation from it, is uſed as food. This is however eaſily explained. The cattle of the oriental iſlands yield too ſcanty and precarious a ſupply to conſtitute an article of food. The *Brahmans* of *Bali* dwelt upon this circumſtance, and ſaid that their books recommended to them the milk of the cow, and a certain oily preparation from it as the moſt excellent of all diet: but that it was their misfortune that the cattle of their iſland did not afford them the food ſo peculiarly preſcribed to them by their religion.

IN *Bali* there are no *Fakirs*; no mendicant devotees ſuch as overrun weſtern *India*. Neither a[illegible]s I could diſcern is there any thing known of thoſe abſurd penances, and thoſe whimſical and painful practices by which the *Aſcetics* of weſtern *India* recommend themſelves to diſtinction. The auſterities of a *Brahmana* or *Pandita* on *Bali* conſiſt of exerciſes of ſelf-denial; ſuch as abſtinence from certain deſcriptions of food; excluſion from the ſociety of mankind, and retirement to caves and foreſts. Celibacy is occaſionally but rarely in the liſt of meritorious auſterities. The three inferior claſſes among the *Balineſe* ſeemed to me to eat indiſcriminately of every ſpecies of animal food, commonly deemed edible; among thoſe, pork is evidently the favorite food. We ſaw great numbers of hogs of an excellent kind which ſeemed to be taken great care of. They conſtitute indeed the principal animal food of the people. At an entertainment given to the officers of the expedition by the raja, Rand at which he himſelf preſided, pork dreſſed in a great variety of forms, made up the largeſt portion of the feaſt. The *Brahmans* alone refuſe to eat with the inferior claſſes. At this feaſt

the Raja drank tea prepared and handed to him by his attendants, who were generally *Sudras*: he even went further, and did not ſcruple to receive the ſame beverage handed to him by a *Chineſe*. An *European* long accuſtomed to the unſociable prejudices of weſtern *India*, on a ſubject in itſelf indifferent, will be agreeably ſurpriſed to find an almoſt total abſence of all prejudices on this point in the population of the oriental iſlands. On *Bali* one might ſee a *Hindu*, a *Chineſe*, a *Mahomedan*, and a *Chriſtian*, ſit at the ſame board and partake with little exception of the ſame fare.

The *Buddhiſts*, from the account I received of them from the *Saivas*, are ſtill leſs ſcrupulous in the matter of diet than the latter, who ſtated of them as a matter of reproach, that they did not heſitate to eat carrion and the fleſh of dogs.

Neither the *Brahmans*, nor the other twice-born claſſes of *Bali* wear the thread, which is their uſual badge in *India*; nor did I obſerve the uſe of any ſectarial mark whatever. The want of the latter may be eaſily accounted for; for where nearly all are of the ſame ſect, diſtinction becomes ſuperfluous. The abſence of the thread is certainly ſingular and calculated to excite ſuſpicion reſpecting the purity of their extraction. The firſt ſettlers neceſſitated to intermarry with the natives of the country, might ſtill regard the injunctions of religion ſo far, as to deny to their contaminated poſterity, the uſe of the ſacred badge of their order.

A Brahman of *Benares*, one of our ſepoys was introduced into the preſence of the Raja. He acknowledged that the *Balineſe* were degenerated *Hindus*; but added rather vaguely that all the reſt of the world but his own countrymen were ſo too. I need hardly obſerve that he and my *Bali* friends were mutually unintelligible to each other. I

pointed out to the latter the facerdotal cord which he wore: but the nature of it was altogether incomprehenſible to them.

Of all the cuſtoms which certify the eſſential *Hinduiſm* of *Bali*, there is none of ſo decided and unequivocal a character, as the ſacrifice of the woman on the funeral pile of her lord. The following is a ſhort account of the ceremony as practiſed on *Bali*. When a wife offers herſelf the ſacrifice is termed *Satya*; if it be a concubine, ſlave, or other domeſtic, it is called *Bela*. A woman of any caſt may ſacrifice herſelf in this manner; but it is moſt frequent with the *Satriya* and *Wiſyk*. It very ſeldom happens that a woman of the ſervile claſs thus ſacrifices herſelf; and what is ſtill more extraordinary a woman of the facerdotal order never does.

In the vicinity of every town or large village, a place is ſet aſide for this ſolemnity. It is the ſame where the common dead are burnt. On our march to the palace of the Raja, which is two miles from the ſhore, we ſaw a place of this kind where many victims had periſhed. In a pit which was there, there were ſtill ſome aſhes, the relicts of the laſt ſacrifice. The Raja informed me that Captain Sayer of the royal navy, and ſome of his officers were preſent three years ago, when two young females ſacrificed themſelves at this very place. In the manner of performing the ceremony, I could not find that there was any thing which differed from the practice in the ſouthern parts of *India*.

Perhaps the moſt remarkable circumſtance, connected with theſe ſacrifices, is the great number of women who on particular occaſions offer themſelves. The Raja ſtated that when his father's body was burnt, the incredible number of 74 women ſacrificed themſelves with it. I know from the authority of perſons who were preſent, that no

women sacrificed themselves last year on the funeral pile of WAYAHAN JALANTEG, one of the sovereigns of *Lombok*.*

THE Raja of *Blelling* informed me, that there was more need to restrain than encourage the women on such occasions; and the *Mahomedans* of *Bali*, a less suspicious source of information on such a subject, declared that they never knew any instance of force or overpersuasion on such occasions. An instance of humanity and reason it may be presumed not very frequent, is well worth recording. BAGUS JALANTEG, a prince of *Karang-assam* on *Bali*, who died but a few months ago, directed on his death-bed, that neither his wives nor his domestics should sacrifice themselves on his funeral pile. As the bodies of the dead are preserved for a great length of time after death, it seems reasonable to suppose that grief can have little share in the motives which induce the women to determine upon these sacrifices. The meritoriousness of the sacrifice; the honor it confers, and the rewards and distinctions which are thought to await the victims in a future state of existence, I was assured by the *Balinese*, were the only motives which excited the women to destroy themselves on this occasions. The Raja discoursed with me freely on the subject, and seemed to smile at the simplicity of the poor women; though I will not pretend to affirm with how much sincertiy.

THE *Hindus* of *Bali* like those of *India* burn the bodies of their dead. In the treatment observed in other respects, the only circumstance which seems to differ from the practice of the *Hindus*, is the long period which it is customary to preserve the body previous to burning it. This is always in proportion to the rank of the deceased. The bodies of persons of the lowest order, are usually preserved for some weeks; and those of persons of rank often for a period exceeding a

* *Lombok* ... principal population of which is *Mahomedan*, was conquered about 50 years ago by a prince of *Bali*; and is still in subjection to the *Balinese*.

year, ſometimes near two. A fortunate day muſt be fixed upon by the *Brahmans* before the body can be conſumed. During this time it is embalmed, and kept in apartments conſtructed for the purpoſe. A relation of the raja died ſome months before our arrival on *Bali*; and his body had then not been conſumed. My curioſity was excited reſpecting it, as four women had given out their intention of burning themſelves with it. I therefore interrogated the ambaſſadors, who came to *Java* four months thereafter, reſpecting it; and found that it had not yet been burnt, the *Brahmans* not having been able to determine on a fortunate hour for this important purpoſe.

THE *Balineſe* eſteem the burning of the dead body, a ſacrifice to BRAHMÁ, whoſe emblem they ſay that element is, agreeably to which BRAHMÁ in their language and in that of *Java*, has become an appellation for fire.*

How the *Buddhiſts* of *Bali* treat the dead, I have not been able to learn. When *Hinduiſm* prevailed on *Java*, a ſect on that iſland expoſed the bodies of the dead to the open air, as is now done by the inhabitants of *Tibet* and parts of *Tartary*, and by the *Perſian* worſhippers of fire. This mode of treating the dead was termed *Setra*; and conſidered in the light of an oblation to the deity of the Sun (SÚRYA). Gold trinkets and beads are now and then found on *Java*, and ſaid to have been the ornaments worn by the dead on ſuch occaſions. It is probable that the ſect which treated the dead in this manner were *Buddhiſts*. The *Brahmans* of *Bali* do not perform the ordinary rites of religion in the temples. This is left to perſons of inferior rank generally *Wiſiyas* or *Sudras*, who are termed *Mamamanku* or guardians of thoſe temples,

* Proper names in *Sanſcrit*, as far as I can judge, are often uſed as appellatives in the languages of thoſe iſlands. Thus, *Brahma* is fire; *Cáli* a river; *Ganga* water; and *Maruta* and *Pawana*, the wind.

The *Brahmans* even went the length of affirming that they paid adoration to no idol whatever, a singular circumstance certainly if true. My own want of sufficient experience will not allow me to decide upon the accuracy of this statement. I must, however observe, that I was a good deal surprised not to meet on that part of *Bali*, which we visited, any images of *Hindu* worship, such as I had been accustomed to see in great numbers on *Java*. I have reason to believe, notwithstanding the strong assertions of the *Brahmans*, that *Hindu* temples really exist in the interior of the island, though they be not common.

The *Brahmans* are intrusted with the whole of the administration of justice, civil, criminal and ecclesiastic. Contrary to the practice of *India*, which places the magistracy in the hands of the military class, it is here the exclusive province of the priesthood, who are possibly from the possession of such valuable temporal authority, induced to leave the common ritual of religion to their inferiors.

In every village there is one or more places of worship. I visited two of these rude temples, which in the language are denominated *Sanga*. They consisted of a square enclosure, the wall of mud, without any other covering than what the shade of an *Indian* fig tree afforded. Upon entering we saw nothing but a few wooden presses of the rudest construction, containing some cups with oil and wicks prepared to be lighted up at night. A *Sudra* entered one of these temples with us, who seemed very anxious to satisfy our curiosity as far as lay in his power. He approached the wooden presses with great reverence, prostrating himself before them ; and muttered some prayer which we could not understand. I asked him through an intrepreter, to whom he paid his adorations ; and he said to the great god of the ocean (Deva agun Ságara.) The temple was within a few yards of

the ſea, and dedicated to the *tutelary* god of that element.*

THE vulgar worſhip of the people differs widely from the religion of the *Brahmans*. I converſed with the latter on this ſubject, who ſeemed to look down on the vulgar ſuperſtition with much contempt. With the populace every ſpot is ſuppoſed to have its guardian deity, to whom a temple is raiſed. He ranks according to the extent or importance of the place he protects. Every nation on *Bali* has its peculiar *tutelary* god; ſo has every village. The mountains, foreſts, and rivers are in the ſame way imagined to have their reſpective guardians. It is to theſe that the groſs worſhip of the common people is chiefly addreſſed, while the *Brahmans* and thoſe inſtructed by them, worſhip the gods of the *Hindu* Pantheon.

AMONG theſe, MAHADEVA or SIVA is chiefly invoked. The *Balineſe* call him moſt frequently PRAMA SIVA "The Lord SIVA"; but he is known to them by moſt of the many names and epithets beſtowed on him in the *Hindu* mythology. He is the ſame deity ſo familiar to the converted natives of theſe iſlands under the title of *Bataragura*. They paint him as an angry and powerful tyrant; in this reſpect agreeing not leſs with his character of deſtroyer in the *Hindu Triad*, than with the attributes of the chief deity of a barbarous people ever miſchievous and malignant. On *Java* where the *Hinduiſm*, which prevailed was, as now on *Bali*, of the ſect of SIVA and of the hereſey of BUDDHA, a great variety of images of the peculiar objects of the worſhip of theſe two ſects are to be met with, while one ſeldom ſees any reliefs of the images more immediately connected with the worſhip of VISHNU. The *Balineſe* have two great religious feſtivals, each of which occurs twice a year, the one ſucceeding the other at an interval of ten days. The firſt in point of

* Within 20 yards of the temple, there was a cock-pit, in which there were full 100 cocks ready trained. The *Balineſe* are great cock fighters.

time is *Galunan* and is of five days duration; the second is termed *Kuninan*, and is of three days' duration. These festivals take place in *December* and *June*, the first being the time in which the great rice cultivation commences; and the second that in which the harvest is reaped; in short the spring and harvest of these southern latitudes. They answer I may presume to the festival of the *Hóli*, and that in honour of DURGÁ in *India*.

THESE festivals are dedicated to rejoicing, festivity, and the worship of the gods, not deemed incompatible with each other. All serious occupation is interrupted; even war at all other times carried on with the relentless ferocity common to *Barbarians*, is deemed unlawful during the celebration of these festivals.

WHATEVER be the religion of the tribes of the oriental islands, one general observation applies to all, that sentiments connected with it make no deep or permanent impression upon them. The prejudices of the *East-insular Hindus* are neither exclusive nor unsocial; nor are their institutions marked by that character of permanency and immutability which we ascribe to the native institutions of *India*; and *Mahomedanism*, as it is practised here, is nearly stript of its zeal and intolerance.* Considerable experience of the *Javanese* in particular has fully convinced me that they regard the precepts of the *Koran*, only when perfectly convenient to them. I do not apply this observation particularly to the common people, who like those of other countries, often want time and opportunity to give their attention to such subject; but to the middling and better classes of society, who enjoy the requisite leisure; and who are not destitute of the intelligence or acquirements that might be supposed necessary to a con-

* The maritime and commercial tribes, such as some of the *Malays* and the principal population of *Celebes* are stricter *Mahomedans* than those of whom I have had most experience. A longer and more frequent intercourse with foreign *Mahomedans* has made them so.

ſideration of ſuch ſubjects. Among theſe there is not an example, one in a thouſand, who abſtain from the open uſe of wine; and in the native courts of juſtice the intereſt of money is ſued for as openly and with as little ſcruple, as in the moſt commercial ſociety in *Europe*.

THESE people are at the ſame time to a wonderful degree ſimple and credulous. It is neceſſary to know them, to be able to underſtand, with what facility they ſometimes lend their belief, to the moſt marvellous and improbable fictions; more particularly if recommended through the medium of religion.

THIS character renders the *Javaneſe* the perpetual victims of deluſion and impoſture. No great plant ſtrikes a deep or firm root in ſuch land, which is the natural ſoil of the periſhable weeds of ephemeral and puerile credulity. Laſt year it was almoſt as if by accident diſcovered, that a beautiful road, more then fifty miles in extent, had been made in a very ſequeſtered part of the iſland, and in the territories of the native princes. The population of whole diſtricts was employed in making it; but for what purpoſe no one could ever diſtinctly tell: Some enthuſiaſt it was ſaid had dreamt or propheſied, that a certain holy perſon was to make his appearance in a certain day and hour on the ſummit of a high mountain,* from which he would deſcend into the plain. A road would therefore be neceſſary for his accommodation; and each man inſtigated his neighbour to the pious undertaking. Five or ſix thouſand perſons were occaſionally at work upon it; and the road was nearly completed in a few months. The facility with which the people were diſſuaded from going on with the work when their uſeleſs toil was diſcovered, is not the leaſt remarkable circum-

* One of thoſe, called the brothers by mariners; perhaps, the moſt lofty in the iſland.

ſtance connected with this ſtrange ſtory. Were this the place, many other curious examples in illuſtration of this character might be adduced; and this is the reſult of our own ſhort experiance of theſe people. The natives of *Bali*, though I am leſs acquainted with them, I can venture to ſay partake much of the ſame diſpoſition. It may be aſked then, how it has come to paſs, that, while ſurrounded by *Mahomedan* tribes, they have reſiſted the introduction of the *Mahomedan* religion, ſo ſucceſsfully and eaſily propagated among the great population of *Java*.* This, I imagine, is to be aſcribed greatly to the many refugees from the laſt iſland, who took ſhelter there on the eſtabliſhment of the *Mahomedan* religion, and to the diſguſt naturally incident to an unſucceſsful attempt on the national religion, which is known to have been made about the peirod of the converſion of the ſurrounding tribes. But perhaps, above all theſe cauſes, it may be aſcribed to the powerful oppoſition which it is reaſonable to conclude, the intelligence, art, and experience of the colony of *Brahmans*, then ſo recently arrived from India, would make to the intrigues of the *Mahomedan* miſſionaries.† Even at preſent the *Balineſe* are more pertinacious, and guarded on ſuch points than I could have expected to find them, judging only by experience of their neighbours.

The elder Raja of *Belling*, whom I have ſo often mentioned, having requeſted me by letter to ſend him ſome *Javaneſe* books; I tranſmitted among others a *Mahomedan* theological treatiſe, tranſlated from the *Arabic*, called "the hiſtory of all the prophets." He returned it to me by the firſt opportunity with the following civil and cautious, but very intelligible reply. "The ſubject of the book which my friend has ſent me," ſays the Raja, "is of a very *weighty* nature. I even fear to

* The population of *Java* ſaid to exceed four millions, conſtitutes probably the moſt numerous native ſtate that ever exiſted in the ſouthern hemiſphere. Four-fifths of theſe ſpeak the ſame language.

† *Bali* means to return, to fall back; a name given to the iſland, it is ſaid, by the *Mahomedan* zealots, who attempted its converſion; in alluſion to the people having elapſed into *Heganiſm*, after once embracing the faith of *Mahomed*.

keep such a performance in my possession; and trust therefore he will not be displeased that I return it."

A few years ago a prince of the *Karang-assam* family,* who are sovereigns of *Lombok*, having visited the neighbouring island of *Sumbawa*, the principal population of which is *Mahomedan*; was circumvented by the art of some *Mahomedan* priests, and became a convert to their religion: Ketut Karang Assam, his sovereign and relative, highly incensed at his apostacy, immediately withdrew from him his support, and even forbid him his country. The unfortunate prince in consequence wandered about for many years a wretched outcast; and at last perished by shipwreck on the coast of *Ceylon*, on his return from a pilgrimage to *Mecca*. The *Mahomedans* look upon him as a martyr, and his story is a subject of frequent conversation with them.

The *Balinese* however carry their jealousy no farther than seems reasonably necessary to their own security, against the attempts of a religion decidedly hostile to their own. Both the *Mahomedans* and *Chinese* enjoy the most undisturbed exercise of their respective worships; and the same indulgence would be extended no doubt to any other peaceable sect. The *Mahomedans*, though excluded from settling in the interior, or exercising any office directly connected with the details of domestic policy, are admitted to employments of trust and emolument about the persons of the princes. The confidential minister of the Raja of *Blelling*, I found was of that persuasion. Some of the *Mahomedans* themselves gave me to understand, that the protection of some of the native princes was carried to a still greater length, some going so far as to insist with their *Mahomedan* subjects upon a more punctual performance of the duties of their religion, than was suited to the lukewarm devotion of many of them.

* The princes of this family, but they alone, of the sovereigns of *Bali* and *Lombok*, are of the *Wisya* or mercantile class; the rest uniformly of the *Satrija* tribe.

One of the Rajas of *Lombok*, whom I have already mentioned, a venerable old man of 80, who is now on the throne, is diſtinguiſhed for his attention to this ſingular kind of diſcipline, ſo entirely however in the ſpirit ſo often aſcribed to *Polytheiſm*.

The learning of the *Balineſe* is contained in a dead language, called *Kawi*. The *Kawi* bears the ſame relation to the vulgar dialects of the *Archipelago*, that the *Sanſcrit* does to the *Pracrit* dialects of *Hinduſtan*; or as the *Pali* does to the languages of the further *Peninſula* of *India*. It is the language of learning, of religon, and of the laws.

The *Kawi* may be written either in the modern character of *Bali* and *Java*, which are the ſame (ſee note A); or in a more ancient and perfect one, now nearly out of uſe, and alſo common to both. The modern alphabet contains 20 conſonants and five vowel ſounds: but has no characters for the initial and medial vowels. The ancient alphabet has the ſame number of conſonants and vowels; two dipthong ſounds with characters for the medial and initial vowels. Both are formed on the principles of the *Dewa Nagari* alphabet, and the ancient alphabet in particular bears it a very cloſe reſemblance. The *Kawi* in point of conſtruction, partakes of that ſingular degree of ſimplicity, which is ſo univerſal a character of the languages of this part of the world. It differs from moſt of theſe in a frequent uſe of the paſſive ſignification of verbs, amounting indeed to a ſort of excluſion of their active ones: a want of a pronoun of the third perſon, and in having the adjective in poſition placed before the noun.

Is the *Kawi* the original language of ſome nation of the continent of *India* imported by the firſt adventurers, or is it rather a language gradually formed by ingrafting upon the meagre dialect of the aboroginal inhabitants of theſe countries, a large portion of the language, which contained the religious inſtitutions and arts, which the *Indian*

adventurers introduced among the barbarous and savage tribes of the oriental islands (see note B.)

WITH a thorough conviction of my own incompetence to decide on this question, I have endeavoured to collect the materials to enable the oriental scholar to do so, and have for this purpose appended to my essay a short vocabulary of *Kawi* words, and an extract from the *Kawi Mahabharat*, with an *English* version made through the medium of the common *Javanese* language. The translation is I hope as faithful as can be expected under such circumstances. (See Note E.)

ALL *Kawi* composition is in regular measured verse,* of which there are twelve radical stanzas, from which a variety of others may be formed, according to established rules of prosody. These rules are, I imagine, borrowed from those in use in *India*. To enable the *Sanscrit* scholar to judge, I specify the names of the 12 radical stanzas which are as follow: *Sardula-wikundita*, *Jaya-dita*, *Wahirat*, *Basanta-tilata*, *Wansa-patra*, *Srakdara*, *Sakarine*, *Swandana*, *Champakamalya*, *Prawira latita*, *Danda*, and *Katri-padma*.†

THE most popular and esteemed work in *Kawi* is the ‡ *Brata-yuda* or holy war, which I imagine is the great *Indian* poem the *Mahabharat*, or rather a *paraphrase* of it. The *Javanese* imagine it to be an original work, and do not scruple to point out on *Java* the site of ‖ *Astina* and the various scenes of the wars of the *Mahabharat*. The *Brata yuda* was composed (I

* This confirms the etymological affinity between the word *Kawi*, and the *Sanscrit* terms *Cawi* a poet, and *Cawya* poetical composition.—*Note by the Secretary.*

† Of the forms here enumerated eight are decidedly *Sanscrit*, viz. *Sardula vicerdita*, *Vasanta tilaca*, *Vansapatra*, *Sragahara*, *Sic'ha'ni*, *Champaka mala*, *Prawara-latita*, and *Danda*; (see the [illegible] annexed to Mr. COLEBROOKE's essay on *Sanscrit* and *Prakrit* Poetry, A. R. vol. 10, p. 468); the remaining four have every appearance of being *Sanscrit* terms, though the change they may have undergone both in their pronunciation, and in the written expression of the sounds, makes it difficult to verify them.—*Ditto.*

‡ Probably, a correction of *Bha'rata*, the family of BHARATA, amongst whose descendants the war occurs, and *yuddha* war.—*Ditto.*

‖ *Hastinapur* ancient *Dehli*, or a city about 50 miles N. E. of the modern city of *Dehli*, the capital of *Yudhish'thir*.—*Ditto.*

ſhould rather ſay tranſlated or *paraphraſed*) in the *Javaneſe* year 1117, by a *Brahman* of *Java*, called PUSEDDAH. This date is invariably prefixed to every copy of the work. The ſacred and myſtical ſyllable *Om* or *On*, as the *Javaneſe* pronounce it, is alſo not unfrequently prefixed, and I think is a certificate of the genuine *Hinduiſm* of the poem. The language of the *Brata-yuda* is much more modern than that of ſeveral other works in *Kawi*.

IN *Kawi* there is a verſion of the RÁMÁYANA, identified with the celebrated poem of VÁLMÍKI, by a preciſe ſimilarity of title, and (as far as my limited means of informing myſelf will enable me to judge) of ſtyle and ſubject. The language is more obſolete and obſcure than that of the *Brata-yuda*; and of the hiſtory of the compoſition nothing is known.

ANOTHER work in *Kawi* is termed I believe with ſufficient accuracy *Niti-Saſtra*. It is a treatiſe on ethics in a ſtyle ſtill more antiquated and obſcure than either of the two laſt works.

A FOURTH and fifth work are called *Vivaha* and *Arjuna-vijaya*. Theſe are legends of ARJUN, a hero, whoſe name is of great renown on *Java* and *Bali*.

OF works on religion and law I can do no more than repeat the liſt with which the *Brahmans* of *Bali* furniſhed me. Prefixing to each name the word book or writing, the liſt is as follows:—*Agama, Adigama, Purwadigama, Saviſa muſchayagama, Kutara-manawa, Dewagama, Maiſwati, Tatwa, Wiya-waraha, Duſta-kalabaya, Slokantaragama, Satmagama* and *Gamiyagamana*.*

* Moſt of theſe works, as well as thoſe mentioned above, are manifeſtly of *Hindu* origin; the term *Agama* which enters into the compoſition of moſt of the works here ſpecified is a *generic* term in *Sanſcrit* for any compoſition treating of thoſe ſciences which are conſidered by the *Hindus* as ſacred.—*Note by the Secretary.*

The *Brahmans* of *Bali* complained of the loſs of ſome works of importance connected with their religion, and made anxious enquiry reſpecting their exiſtence in *India*. I had not learning enough to give them a ſatisfactory reply; nor can I now even call to mind the names or titles of the works in queſtion. The converſation unfortunately took place in a moment of haſte, when it was out of my power to take notes of what paſſed on the ſubject.

I have looked in vain both on *Java* and *Bali* for any veſtige of the *Hindu* ſcriptures or *Vedas*; and though I reaſonably diſtruſt the ſkill with which the enquiry was purſued, I am yet ſtrongly inclined to believe, that they have no exiſtence; and probably never had among the *Hindus* of the oriental iſlands. It ſeems ſingular enough, that an orthodox ſect of *Hindus*, as the worſhippers of Siva are, ſhould not be in poſſeſſion of the ſacred text. The inferior caſts among the *Hindus* are by the ordinances of their religion interdicted from reading the *Vedas*. Did the firſt *Brahmans*, who ſettled in the *Archipelago*, lie from ſome impurity or contamination under a ſimilar interdiction; or were they pretended *Brahmins* only, and in reality perſons of inferior rank, to whom the uſe of the *Vedas* was unlawful? Or laſtly did the firſt *Brahmans*, compelled by neceſſity to intermarry with the aboriginal inhabitants, conſcientiouſly forbid the *Vedas* to their polluted poſterity?

Among the writings which exiſt in the *Kawi*, the pureſt ſource is the numerous inſcriptions on ſtone and copper which are found on *Java*. Theſe are all in the ancient character. From ſkilful tranſlations of theſe, the hiſtory of *Hinduiſm* in the oriental iſlands will receive much elucidation. It is an intereſting and important fact of theſe inſcriptions that by far the greater portion of them have well defined dates. I have peruſed ſome nearly 1,200 years old. The greater portion however, do not exceed half that antiquity; but many refer to a ſeries of dates long antecedent to the date of the inſcriptions themſelves. Of the ſtyle of

these inscriptions, I may observe, that it is mysterious and enigmatical, abounding more in exhortations to piety and observance of religious duties, than in any important matter of fact. What portion of the sciences of *India* the *Brahmans* of *Bali* are in possession of, I had no means of ascertaining with any accuracy, and had such opportunity occurred. I should have been unable to avail myself of it for want of acquaintance with the original subject. The scanty remarks however, which I have collected on this subject, I willingly submit.

The *Indians* have taught the inhabitants of these island their *decimal* system of notation which is in common use on *Bali* and *Java*. Whatever progress the natives of these islands have made in astronomy, seems in a great measure also borrowed from the same source. Their year is lunar consisting of 360 days, which they divide into twelve unequal portions called* *Masa* or seasons. The length of each is as follow:

1st, 41 days.
2d, 23 ditto.
3d, 24 ditto.
4th, 24 ditto.
5th, 26 ditto.
6th, 41 ditto.
7th, 41 ditto.
8th, 26 ditto.
9th, 25 ditto.
10th, 25 ditto.
11th, 23 ditto.
12th, 41 ditto.

* In *Sanscrit* and its *Hindi* derivatives a *month*; the solar month is recognized in *Hindu* computations.—*Note by the Secretary.*

It is the buſineſs of the *Brahmans* to keep this reckoning and to adjuſt this calculation, which is ſolar, to the lunar year. It is a function of practical importance as the occupations of the huſbandman are directed by theſe meteorological ſubdiviſions of the year. Each ſeaſon is appropriated to a particular employment, which the huſbandman never commences till methodically warned to it by the *Brahmans:* what the *Brahman* does on *Boli*, the *Mahometan* prieſt performs on *Java*.

The days of the week are, I may preſume, evidently *Indian*, and ſo are the names of the ſigns of the zodiac: both are inſerted in the catalogue* of *Kawi* words, that the *Sanſcrit* ſcholar may be enabled to determine. Copper cups have been found in numbers on *Java* with the *Hindu* ſigns of the zodiac engraven upon them; and I diſcovered at *Talaga* in the diſtrict of *Cheribon*, a *Kawi* manuſcript in the ancient character, which among many other *Hindu* figures, had the ſigns of the† *zodiac* diſtinctly depicted upon it.

The *Hindus* of the oriental iſlands are not without ſome knowledge of chronology. The four fabulous eras of *Indian* chronology are known to them under the following names: *Karta-yoga, Treta-yoga, Dwapara-yoga* and *Kali-yoga*. The duration of each period is not ſpecified; but that aſſigned to the whole, differs, in a moſt remarkable degree, from the account of the *yogas* given by the *Indian* chronolo-

* This catalogue has not been received by the Society.—*Note by the Secretary.*

† This performance appears to be an aſtronomical treatiſe. It is written with black and red ink, upon a ſtrong paper, almoſt reſembling parchment. The manuſcript conſiſts of ſeveral long ſlips of papers folded *zig-zag*; and each compartment forming a diſtinct page in the way that I have ſeen *Burman* and *Siameſe* manuſcripts, written. This is the only ancient manuſcript that has to my knowledge ever been diſcovered on *Java* by *Europeans*. Of the hiſtory of it nothing was known, nor was there any one in that part of the iſland who could read a ſyllable of it. It was not the leſs regarded on that account. The people of the diſtrict viewed it with ſuperſtitious veneration, and no conſideration would induce them to part with it. Money and a valuable Koran were offered in vain. The chief, in whoſe poſſeſſion it was, aſſured me with much ſimplicity, that the crops would fail, and famine and peſtilence aſſail the land, if the holy relic quitted it.

gifts. The united amount of the four periods, counting to the commencement of the preſent era, is no more than 15,025 years. I literally tranſcribe the account of the *yogas* with which I was ſupplied, without pretending to offer any explanation of the ſingular diſcrepancy between it and all the *Indian* accounts, however diſagreeing among themſelves.

THE common era of the eaſt—inſular *Hindus*, take their riſe by their own account from the date of the firſt introduction of *Hinduiſm* among them. This event took place in *Java** 1742 years ago, and in *Bali* five years later. The *Javaneſe* era is called the era of AJI SAKA. This I ſuſpect, implies a tautology, as it means no more than the era of the prince who inſtituted the era. The leader of the firſt *Indian* colony to *Java* was a *Brahman*, named TRITUSTI, who is with reaſon believed to be alluded to under the title of AJI SAKA; dates are ſome times written in figures, which is generally the caſe in the different inſcriptions found on *Java*: but a practice which I believe to be *Hindu*, that of ſubſtituting written images, bearing ſome analogy to the number intended to be repreſented, is much more frequent. The whole of the numbers of a particular date are ſtrung together into a verſe, in which is generally implied ſome alluſion to the tranſaction which it records. An example or two will explain this.

THE following line commemorates the building of the principal temples at *Brambanan* on *Java*:

BRAHMANA *iku hanara wulan.*

8 1 2 1

THIS means "that *Brahman* held up the moon in both hands." It means to imply that the place was built by *Brahmans*, and the mar-

* The *Javaneſe*, notwithſtanding their converſion to *Mahometaniſm*, ſtill preſerve the *Hindu* era, and never calculated by the *Hejira*.

vellous effort which one of them is deſcribed as making, probably alludes to the power and labour which the accompliſhment of ſo great an undertaking required. Read inverſely, it gives the year 1218.

SIRNA *ilan kirti-nin bumi.*

0 0 4 1

is a line which commemorates the deſtruction of *Majapahit*, the laſt *Hindu* ſtate of *Java*.

THE verſe literally means "Loſt, loſt is the work of the land." Read inverſely it gives the *Javaneſe* year 1400. The tenor of the verſe indicates a feeling of regret for the loſs of the city.

To what extent the *Balineſe* have imitated the ſculpture and architecture of the *Hindus* of weſtern *India*, I have, as already obſerved, had no opportunity of aſcertaining.* But many of the *Engliſh* who have viſited *Java*, have had ample opportunity of appreciating the ſkill and extent with which the *Hindus* of that iſland had imitated theſe *Indian* arts. A view of the relics on *Java*, it may be ſaid, has excited, though to an inferior degree, the ſame ſentiments of ſurprize in an *European* which have always been felt at the contemplation of the great monuments of *Hinduiſm* in *Hinduſtan*. They diſplay a portion of the ſame laborious and indefatigable perſeverance which characteriſes thoſe ſtupendous relics of *Hindu* art, which have been ſo often deſcribed. (See Note c.)

IN the political inſtitutions of the *Hindus* of the oriental iſlands may be traced many of thoſe which peculiarly characterize the ſyſtem of *Hindu* Government. Whereever the *Hindu* religion has made conſiderable progreſs in theſe iſlands, the hereditary government of a ſingle individual will be invariably found eſtabliſhed; where it has not, we ſee free, but ſavage communities; and ſtill more frequently elective

* My reſpectable and amiable friend Colonel MACKENZIE has given a ſketch of *Brambannan* in the *Batavian Reſearches*. The word in the *Javaneſe* language imports "the place of *Brahmans*."

and turbulent monarchies: in the *Hindu* ſtates the adminiſtration is entruſted to a miniſter; in the elective monarchies it is chiefly conducted by a council. With reſpect to the condition of landed property, I believe I may ſafely venture to aſſert, that on *Bali* in particular, it is preciſely the ſame as it now exiſts in *India*, in thoſe *Hindu* ſtates which have leaſt felt the influence of the *Mahomedan* principles of Government. A right of private property in the ſoil is recognized with a reſervation to the ſovereign of a portion of its produce.* Each village forms a little municipal community complete in itſelf, having its chief, a deputy, a village prieſt, &c. each entitled to ſome ſmall remuneration from the funds of the village. If this were the place, theſe parallels might be carried a great deal further. A ſhort enumeration of the names and titles of the officers of government, will convince us how cloſely the oriental iſlanders have imitated the *Hindu* originals. *Rajah*, a Sovereign prince; *Pateh*, a miniſter; *Adipati*, a title of nobility; *Noyaka*, a noble; *Mantri*, a title of nobility; *Sena-pati*, a commander in chief, &c.† Theſe, I believe, are pure *Sanſcrit* words; and the number I have little doubt could eaſily be increaſed by any one acquainted with that language.

I HAVE now to offer a few obſervations on the hiſtory of the introduction of *Hinduiſm* into the oriental iſlands. The information which I have been able to collect reſpecting this ſingular occurrence, will be found more preciſe and extenſive, than might, at firſt view be expected, and it may ſeem unaccountable, that facts of ſuch importance and ſo well known to the natives themſelves, ſhould be confined to them,

* The principal on which the land is aſſeſſed on *Bali* is peculiar; but wears at leaſt the air of reaſon and juſtice, reconciling and aſſimilating the intereſts of the ſovereign and ſubject. The Rajah is, by a fort of fiction, conſidered the proprietor of all the water of irrigation, and to him are entruſted what in theſe countries may ſtrictly be termed the important functions of managing and directing it. Each proprietor pays a tax proportionate to the ſupply he receives; and the revenue of the prince is in the ratio of the quantity he ſupplies. It is his intereſt therefore, to keep the water courſes in repair, to construct new canals, and to extend the cultivation.

† In *Sanſcrit*, *Rajah* a prince, *Pati*, a maſter or lord, *Adhipati* a governor, *Nayaca* a leader, *Mantri* a miniſter, *Senápati* a general.—*Note by the Secretary.*

when *European* influence has been eſtabliſhed over the very people poſſeſſed of this valuable knowledge, for more than two centuries.

I MAY begin by obſerving, that the precept of the *Hindu* religion, which interdicts the natives of *India* from quitting their native country, and attempting voyages by ſea, is no better obſerved than the law of *China*, which prohibits emigration. In the very country whoſe hiſtory we are now conſidering we ſee both every day violated. *Hindus* from the *Coromandel* coaſt (always the ſource of emigration to theſe iſlands) come every year to ſeek their fortune in the *Malay* countries; and I have ſeen a colony of theſe ſettled at *Malacca*, who have for generations preſerved the features, the language and religion, of their anceſtors. This is enough to ſet at reſt the queſtion of the practicability of *Hindu* emigration.

KLING or *Kalinga* is univerſally conſidered by the oriental iſlanders as the country from which the civility, laws and religion of *India* were introduced among them; and *Java* as the country which firſt acquired the arts of *India*, and from which they were diſſeminated among the ſurrounding tribes.* The natural advantages of *Java* would ſeem to have determined the *Indian* adventurers to this preference. The narrow ſhape renders the whole of it, unlike the other great iſlands, eaſily acceſſible: but above all, its preeminent fertility appears to have fixed their choice. In proof of this latter conjecture I would obſerve that the weſtern portion of the iſland, though lying neareſt the route from *India*, being in point of fertility far beneath the eaſtern and central parts, ſeems to have been entirely neglected by the *Indian* coloniſts. There, there is hardly a veſtige of *Hinduiſm*, neither temple nor inſcription; and the language of the *Sundas* does not like

* This opinion is predicted with much ſagacity by a writer in the *Edinburgh* Review, vol. XVI, page 393.

that of the *Javaneſe*, abound in *Sanſcrit* terms, while in arts and improvement the former are far beneath the latter.

THE firſt *Indian* colony which came to *Java* is ſaid to have arrived in the firſt year of their preſent era, or 1742 years ago. The leader of this adventure was a *Brahman* of the name of TRITUSTI. The landing is ſaid to have been effected on the ſouth coaſt of the iſland, and the firſt eſtabliſhment to have been made at the foot of the mountain of *Sumeru*, or *Meru*, which ſtill preſerves that name. TRITUSTI eſtabliſhed the preſent era, and he is from thence more commonly known by the title of AJI SAKA, or the founder of the era. Accounts are not agreed reſpecting the number of this firſt colony; but no ſtatement which I have heard is ſo exaggerated, as not to be reconcilable to probability, the higheſt making it to amount to no more than 190 families.

IT is an important and intereſting fact reſpecting this emigration that the perſons of whom it conſiſted, were not all male adventurers; but that women and children were of the number. The conſort of the leader, and his two ſons are expreſsly mentioned by name, the former called BRAHMANI KELI, and the latter MANUMANSA and MANUMA DEWA.

WHAT over-ruling cauſe could induce a colony of *Hindus* to attempt (to them) a diſtant and dangerous voyage, and with their wives and families, to ſeek a refuge in an unknown country, ſeems at firſt a queſtion of difficulty. Seeking a cauſe of ſufficient magnitude for ſuch an effect, and comparing the date of the emigration uſually aſſigned to the perſecution of the *Buddhists*, and their expulſion from weſtern *India* by the ſuperior influence of the *Brahmans**; I am in-

* Is not the term "religion of the *Brahmans*" oppoſed to that of the "religion of BUDDHA," at leaſt a very dubious expreſſion? Are there not *Brahmans* of both perſuaſions? On *Bali*, as I have already ſtated, the word *Brahman* is applicable alike to the prieſts of both ſects.

clined to think that the emigrants who took refuge on *Java*, conſtituted a branch of the general emigration of the followers of BUDDHA, who ſpread their religion among the population of *Ava*, *Siam*, *Japan*, *China*, and other eaſtern countries.

TRADITION indeed gives no account of the particular tenets of the firſt adventurers to *Java*. In the courſe of ages perhaps no great difference remained between the two ſects, except what was merely doctrinal. Under thoſe circumſtances, poſterity might forget the particular tenets of the early coloniſts. That no hoſtility ſubſiſted between the later times may be ſtrongly preſumed; I ſhall adduce one proof only. In the great *Buddhiſt* temple already deſcribed in a note, there is not a ſingle image of the worſhips of SIVA or VISHNU, nor even any figure which I could identify with them; yet within a mile of it, there are two ſmall ones evidently conſecrated to the orthodox religion, as might be ſeen by their decorations: a fine ſtatue of BRAHMA upwards of ſeven feet high was diſcovered by us near the ruins of one of them.

THE ſons of TRITUSTI and their deſcendants, are ſaid to have ſucceeded him in the government of his colony down to the firſt century of the *Javaneſe* era. In the year 417, the principal ſovereign of the iſland claimed his deſcent from the firſt adventurer. If therefore *Buddhiſm* was the religion of the firſt ſettlers, it is probable it was the prevailing one down to that period.

FROM the arrival of the firſt ſettlers down to the year 350, a crowd of coloniſts and adventurers continued to come to *Java*; from which circumſtance the inference I ſhould draw, is that the ſame cauſe continued to impel them to emigrate, or in other words, that the perſecution of the followers of BUDDHA in *India*, continued down to this period. The date of the arrival of the principal adventurers is ſtated as follows:

SELA PRAWATA, in the year	100.
GOTAKA, in	200.
SUWILA, in	310.
HUTAMA, in	331.
TRISDI, and his son * DASA BAHU, in	350.

ABOUT the year 350, the emigrations seem to have become much less frequent. The animosity of religious persecution had probably now ceased.

THE connection with *India* was however by no means interrupted. Adventurers continued to arrive from time to time, and *Javanese* princes are occasionally described as visiting *Kalinga* down to the conquest of † MAJAPAHIT on the *Javanese* year 1400.

IN the year 480, a number of *Pandits* are stated to have come to the island holding doctrines unknown to those who had come before them. The chief of these was DARIYARI KUMBANA. Their opinions being obnoxious to the people, they were maltreated and expelled from different native states, till they at last found refuge with SUYUDANA, the principal sovereign of the island, who made their chief his *Guru*, implying no doubt that he had embraced his opinions. Does this circumstance mark the first arrival of the worshippers of SIVA ?

A FEW years previous to the *Mahomedan* conversion of the *Javanese*, a number of *Brahmens* of the sect of SIVA, arrived on *Java*, and received protection from BRA-WIJAYA, the last sovereign of *Majapa-*

* The latter, in his capital which was called *Hastina* after the city of the *Pandús*, was attacked by hostile chiefs from *Kalinga*, the principal of whom called himself Raja of *Salanapuri*. The *Hindus* of *Java* have acted like all other settlers in new countries, and imposed the names familiar to them in their own on their new acquisitions. There is hardly a name of celebrity in the original country of the *Hindus* which has not its parallel on *Java*. Even the princes and chiefs have assumed names celebrated in the legends.

† *Majahapit* meaning of the place where grows the *Maja* of a bitter taste. *Maja* is the name of a fruit-bearing tree.

hit. On the overthrow of that ſtate, they fled to *Bali* under their leader WAHU-RAHU, whoſe name is held in great veneration by the *Balineſe*, who conſider him no leſs than their apoſtle. The preſent *Brahmans* of *Bali* informed me that they were the tenth in deſcent from WAHU-RAHU and his companions. Except this I know nothing of the particular hiſtory of the introduction of *Hinduiſm* into that iſland. The era of *Bali*, however, is ſaid to take its riſe like that of *Java* from the arrival of the firſt *Indian* colony. It dates five years later than the latter; a circumſtance which, when, we conſider the greater diſtance of the country, ſeems to give the ſuppoſition an air of probability.

THE *Indian* adventurers, who came to *Java* without uniting or combining, ſettled in various and diſtant parts of the iſland, where they founded independent ſtates. The influence and power which they acquired ſeems not to have been gained by force or conqueſt, but to have been the reſult of art and perſuaſion, exerciſed through the medium of religion over the minds of a ſimple and credulous people; in a word the natural conqueſt which knowledge ſkilfully or artfully applied gains over ſimplicity and ignorance. That the natives were not compelled by conqueſt to adopt the *Hindu* religion, is, I think, fully proved by a fact generally admitted, that the *Indians* have not introduced into the languages of theſe iſlands any portion of their own vernacular dialects, while from the language of religion, literature and ſcience, that is from the *Sanſcrit*, there has been a copious influx. In the comparative ignorance of navigation, which has always characterized the *Aſiatics*, it may indeed be deemed next to impoſſible that any *Indian* ſtate ſhould poſſeſs the ſkill or means to fit out a fleet or armament adequate to a diſtant voyage; or fit to accompliſh the ſettlement or conqueſt of a great country. If we conſider the firſt emigrants as perſecuted refugees, we ſhall be ſtill more firmly of this opinion.

THE firſt care of the new comers would be to acquire the language of the people, as the beſt means of recommending themſelves and the only means of propagating their opinions. When they came to inſtruct their new diſciples in religious duties, their inſtruction would be delivered in the language of the country, into which they would find it neceſſary to introduce ſuch words as were neceſſary to explain the new ideas which they wiſhed to communicate. In communicating a knowledge of arts and ſciences, the ſame courſe would be purſued and hence the influx of a new claſs of ideas. From what language is it probable that the *Brahmars* would borrow ſuch words? not, I imagine, from the vernacular dialects of their own country; but from the *Sanſcrit*, the common language of literature, of religion, and ſcience, wherever the *Hindu* religion prevails. On this ſubject it is with much diffidence that I venture to diſſent from the opinions of ſuch a writer as Mr. MARSDEN. The extenſive influence of the *Sanſcrit* upon the dialects of the oriental iſlands, he is decidedly inclined to aſcribe to conqueſt, and long continued domination, a ſuppoſition which appears to me incompatible with the facts which we know on this ſubject. By forming ſuch a concluſion, we ſhould be compelled to believe, that the vernacular language of the ſuppoſed conquerors was pure *Sanſcrit*; an hypotheſis untenable, as of the exiſtence of a people of whom *Sanſcrit* was the living language, there remains no hiſtorical record.

CONQUEST and entire ſubjugation (if the invaders ſettled in the conquered country) has never failed to introduce a great portion of the vernacular language of the conquerors, moſt frequently indeed completely altering the original languages of both parties to the formation of a third.

ONE of Mr. MARSDEN's arguments is drawn from conſideration of the primitive and ſimple character of the claſs of ideas, to which

Sanſcrit words are often applied. Many of the inhabitants of theſe iſlands were no doubt in a barbarous ſtate before they became acquainted with the *Hindus* of *India*, and muſt have wanted terms for many ideas which a farther improvement has made familiar to them. Such they neceſſarily borrowed from the *Sanſcrit*; but the paucity and the meagreneſs of the radical portion of their own languages in general, is by no means ſuch as to convince us, that their condition in ſociety was extremely low and degraded previous to the improvement for which they are indebted to the *Hindus*.

The *Javaneſe*, though acquainted with the *Sanſcrit* numerals, have a claſs of numerals of their own; nay, a double claſs ſuitable to the rank of the ſpeaker. With theſe they count as far as a thouſand, after which they reckon by the *Sanſcrit* numerals as far as a hundred millions. The *Malay* does the ſame thing without going ſo far. This affords an example of the manner in which the vernacular languages have borrowed from the *Sanſcrit*. Words, implying conſiderable abſtraction indeed are generally borrowed from the *Sanſcrit*; ſo are terms of ſcience, with the language of Theology, and the names of arts, implements, and productions, in the uſe of which the inhabitants of theſe iſlands have been inſtructed by the *Hindus*. Such words as expreſs thoſe ordinary feelings and ſocial relations common to our ſpecies as abſtracted from thoſe reſulting from peculiarity of manners and cuſtoms, and from the knowledge of the arts of cultivated life, will in general be found to be expreſſed by native terms. That ſuch ideas are often expreſſed by *Sanſcrit* words is fully admitted; but if I am not miſtaken, it is ſeldom that native ſynonymes are wanting for the ſame words. In theſe languages, as in all others, a foreign term is often preferred to a native one, for which no reaſon can be aſſigned unleſs the whim of faſhion and the love of innovation be admitted as ſuch. Sometimes the native term becomes obſolete, and once becoming

obſolete, it is no difficult matter to conceive, that it may occaſionally be altogether forgotten. In the *Javaneſe* language I can ſafely affirm, that for all the examples given by Mr. MARSDEN, native ſynonymes, and generally more than one, may eaſily be ſupplied. The radical portion of the *Malay*, however, evidently ſhews itſelf the language of a people far below what the *Javaneſe* appear to have been previous to the *Hindu* converſion of both, if I may be allowed ſuch an expreſſion.

THE ſcanty idiom of a race of naked ſavages as the *Malays* moſt probably were, may well be ſuppoſed to have wanted ſuch terms as Mr. MARSDEN has adduced as examples, more particularly, as ſome of them, ſuch as *loyalty*, *prudence*, *time* and *cauſe*, evidently imply conſiderable efforts of abſtraction, if one advert to the probable ſtate of ſociety in which they were ingrafted upon the firſt ſcanty idiom of the *Malays*.

ALL I intend by theſe obſervations is to point out the weakneſs and fallacy of any reaſoning formed upon ſuch imperfect and limited data as thoſe with which Mr. MARSDEN was furniſhed; and it is far from my wiſh to reflect on that cautious and accurate obſerver, whoſe opinions are already entitled to the greateſt attention and conſideration.

CONSCIOUS of my inability to do juſtice to the ſubject, I willingly drop this diſquiſition, into which the nature of the ſubject has almoſt inſenſibly led me, and finally cloſing my eſſay, ſubmit it to the diſcrimination and learning of the Aſiatic Society, who, I reſt fully ſatisfied, will do ample juſtice to the motives which have induced me to attempt this popular view of the ſtate of the *Hindu* religion on *Bali*, and of its firſt introduction into the oriental iſlands (See Note a.)

Sourabaya, Iſland of Java.

NOTES.

A.—The more recondite portion of *Javanese* literature is also contained in the *Kawi*, and exactly the same with the *Balinese*: *Jawa* or *Jawi*, (both are equally correct,) the one belonging to the common language, the other to the language of deference and respect used by inferiors,) and *Kawi* are used by the *Javanese* as correlative terms; the one expressing the language of the learned, the other the vulgar tongue. When a work is translated from the former it is said to be made *Javanese* or (*Jawi*), hence *Jawi* comes to mean translation or explanation in general. It is exactly similar to our own expression, "to make *English* of." The *Malays*, whose literature is borrowed from the *Arabs*, but above all from the *Javanese*, use it for translation in general, without regard to its first meaning. In proof of this explanation it may be observed, that the term is only applied to the written language, the whole or almost the whole of which is mere translation. That excellent and accurate writer, Mr. Marsden, is much at a loss to make out the derivation of this word. I hope the account now given will appear satisfactory to the man whose acquaintance with every thing connected with these countries is far more accurate and extensive than that of any other individual.

B.—Were I to offer an opinion respecting the history of the *Kawi*, I would say that it is *Sanscrit*, deprived of its inflections; and having in their room the prepositions and auxiliary verbs of the vernacular dialect of *Java*. We may readily suppose the native *Brahmans* of that island seperated from the country of their ancestors, through carelessness and ignorance endeavouring to get rid of the difficult and complex inflections of the *Sanscrit*, for the same reason that the barbarians altered the *Greek* and *Latin* languages to the formation of the modern *Romaic* and *Italian*. In progress of time it seems probable that a number of words of the vernacular dialect, besides the prepositions and auxiliary verbs, would creep in, and such a corruption encreasing would naturally enough account for the different states of the *Kawi*, more or less modern or obsolete as already mentioned. The *Kawi* was probably always a dead language, or if spoken, a language confined to the priesthood.

C.—The most remarkable of these monuments are the temples of Singahsari, said to have been built in 551. *Boro Buddha* built in 939, and *Brambanan* or *Prambanan*, part of which was built in 1218 and part in 1288 A. The second ruin is as its name indicates, a *Buddhist* temple, and in my opinion the most remarkable relic of *Hindustan* on the island. It is a square stone building, consisting of seven ranges of wall, each range decreasing as you ascend, till the building terminates in a kind of dome. It occupies the whole of a small hill which is shaped to receive the walls, and to accommodate itself to the figure of the whole structure. The walls, both inside and out, are decorated with a profusion of mythological ornaments: and an opinion of the size of the whole building may be formed from the number of statues of Buddha which it contains. These are in niches formed for them in the walls and amount to 310, most of them entire. Buddha is represented in a sitting posture, more than three feet high, measured in that attitude. This temple is in the district of *Kodu*, and the choice of its site does credit to the taste of the builders. The country is mountainous; but fertile and highly cultivated, except the summits of the hills, which are covered with lofty trees. Two beautiful streams run at no great distance from the hill, which is occupied by the temple. Upon the whole, a more picturesque or beautiful spot could not have been selected. It may be invariably observed, that the *Brahmans* have made choice of the finest portions of the country for the site of their temples.

NOTE.

D.—I owe to the learning of NATA NAGARA, a prince of *Sumanap* on *Madura*, well known to our countrymen in this part of the world for his merit and modesty, the most essential portion of the ancient history and literature of these islands contained in this paper. NATA NAGARA has the singular merit of being the only native in our possessions; who understands the ancient character in which the *Kawi* is written, or who has made any proficiency in the knowledge of that language itself. *Kawi* learning has been hereditary in the family of NATA NAGARA for 80 years, one of his ancestors having been instructed in it, by a refugee from *Bali*, long after it had been nearly extinct on *Java*.

Extract from the Brata Yoda *or* Kawi Mahabarat, *describing a nocturnal combat between* KARNA *and* GATOTKACHA.

Trika ta san Gatotkacha kinon mapag Arkasuta
Tkap ira Krisna parta manohor moji saktinira
San inojaran wawan masamu garjita harsa marak
Mawachana bagya yan ana pakon ripatik urapati

Pakanan iki lana maraki jan haji yogya nika
Dadaha ri kalanen baya haturnya matoh hapati
Kunan apan iwuh hanrakatani gati harya tamman
Si tutuwa tan panunguha manne sigagan sakaran

Na huwusi san Gatotkacha lumad ati kesawa mar
Tkap ira yan uru yojara nalap manikin wradaya
Huni huni nalanin twasira san paman parda tannyu
Mulati rare niran lumawanin san Awanga pati

Ya karana krisna Parta mawuwus da manneh sakaran
Hasammu kamanusan kaluputan tkapin pannutus
Kunan iki san Gatotkacha mawan sira sigra masoh
Mapagi pamuk san Arkasuta tan duha mandak aras

Apituwi sarwa sanjata wisesa maha stranira
Mijili tanan dudun mijili chankam anut manohu
Yata rumujak san Arkasuta kewran apinila jamman
Muruda kiri muwah mtu suluh bala Pandawa bah

Irika nasoh si alambana lawan hala raksasasak
Wkani Jatasura mati thap nira Bayusuta
Yata manasut datan sabala raksasa wira tara
Patamono wukuia ka pwa puda raksasa rodra jammur

Irika kala sikapne kan Halambana tan duwa pjah
Tkapira san Gatotkacha mamakka ri tangag ika
Ginutukhakan siranuja ri surjudana kagyat hawu
Ku ya ta chanal ni warga mu wuwusnira Bimasuta

Apuli harinja wera san aimbu sana manika
Maka gurilap trisula nika tiksna mawarna udan
Datan in woh tkapnira Gatotkacha tura tara
Ksana tiu kal gulu nira muwah ya binonchan hakan

Muwa hamasoh Halayuda lawan Kalana surasak
Agalaka lina ne bapa tkap nira Bayasuta
Pwa-ni pjah in maha Kalana kirinira tar panapa
Karana nika wuyun ksanika tandu muwah ya pjah

Wawan numahsoh hikan Kalana srangia wanarda wagus
Ika namate rawan wka san Arjuna len nulupuy
Yata tka sahasa m ka samoa lawan Kalana
Ksana mati de Gatotkacha dinak sabalania puna

Ri pjahi kan Duratmaka patan siki tan pabisa
Muwa humasoh san Angapati tan panaha gumulun
Amapag kan panuk prawara Bimasuta risaya
Prasama maganturan pada wisesa taunastra nira

Dana samasor bala nropati karna murud dakukud
Binuru huwus hawas tkap-ikan bala raksasa sak
Kadi Gaja nandaka mulati singha masoh hagalak
Hasingha puleh pjah kasulaya genala tinuja

Karananika laya taya manoli halak bumannan
Krtabbi lakunia len pannaduhe ginola karanah
Kahala tkhen prawira bala korawa sirna larat
Sinusunane sara nupama dewara Pandusuta

Da irika yan padam suluhi kan bala kurawa ras
Ini bala pandawa murud amit ripi kari layat
Swan asammu bahni rudra manke nujwala muntob-aras
Kahimuburan jagat gumasani kurunata kabeh

Mulata wanis ta san Rawi suta kari karwa rata
Karan-nan-ira malas marawase-rata Bimasuta
Ksanika pjah ta sarati Gatotkacha tar nabisa
Ikani kudania manrapa rasania wigirna kanna

Irika msat Gatotkacha maren gagantara mur
Mari mahawan lemah tuwi manandalli mega maya
Irika naras hati nropati karna kalaswana lak
Lumiyati muksa san Kalana nata tan nora katon

Karanan-ira nawak mamenahin sara tiksna wara
Hana riruhur ana rihirinan nuniwi-riharap
Mwan niwuri witna rasmira yadin saka wurywana
Atohor mandiama napati sastra lanit mabalar

Pira ta kunan suweh nropati karna mulut murina
Irika Gatotkacha humunan nantia sakin gagana
Manuchap-akon prayatna saha gorani sabdanira
Tohora dular glap ktuga kantura nen samara

Auktaha san Awanga nata lumiyat rin mega moga ruhur
Duh biyakta san Gatotkacha kalin-iran chitan kawuhan
Sistambiskn kachidra-demu yanimit tan mulat tri lanit
Lin san karna tohor makon tumaduna maka prant bunti

Da tandwa pasarira saksana wibu tikane rimbyat maja
Mungwen madyane ambara wuga agun lir rantakanin darat
Tkwanmata mesinha nada karano-rin burbu gaswa papak
Saksat rudra mamurti kala hamaras rin-uwuh hanirat kabeh

Da yekan pinanah tkap Rawisuta brahmastra muntab murub
Basmin buta gsan tika ksana mijil makin manankar lanit
Pinpat renyah makin tri wikrama katon tan chandra hasnjwala
Kroda krakumasoh harap manugalo tangak san awanga-dipa

Kepwan san Rawiputra donilarutia sarvastra tanpa miyali
Awisti aku pjah tkepnia liniri twas mar tas saras mulat
Nakan marmaniran panambuti rikan kunta sadan baswara
Yuki pandawa wansa-lan-nira tohor manduk hirimbyat maja

Tandwa trus dada san Gatotkacha wawan murcha mano saksana
Datao jrih mabanun sanega tumaddun munsir san angadipa
Singeh Bimasuta angakara maharap matya manunsir kiwul
Kwan lumpat rawiputra las surirana bunlot matingal rata

Kwan tandwa tumaddun mati ratane san karna kewul sarati
Yekan garjita karuwe swara lawan yoda san Duryadana
Tan manka bala Pandawa lara tidam kapya kukud yanonis
Tan waktan wara Bima darma tanaya dan manawa mati prane

TRANSLATION.

PARTA and KRISNA, confiding in the valour of GATOTKACHA, instructed him to meet KARNA in battle. The son of BIMA rejoiced thereat, and deemed himself fortunate in receiving the Prince's commands. "Whether," replied he, "life be preserved, or the body be crushed to atoms in the field of action, your injunctions shall be obeyed." When KRISNA and ARJUNA heard these words of the King of *Purbaya*, they were struck with surprize and unable to speak, lost in admiration of his skill in seizing the affections of his seniors, and of the gallantry which prompted him, yet a youth, to meet the experienced KARNA in battle. KRISNA was touched with compassion for his youth, and would now fain have repressed his ardour, and forbid him the combat; but the son of BIMA would not be dissuaded, and advanced to meet the King of *Awanga*; yet not without some distrust of his strength. He carried with him the choicest weapons. Obedient to his command,

some started from his hands, some issued from his mouth and rushed upon his foe. KARNA was dismayed, and retreating, endeavoured to place himself in a more favourable position. Now the torches of the sons of PANDU were brought forth, and burnt with increasing splendour. There was a RAKSASA, the son of JATASURA, whose name was LAMBANA:—JATASURA, the father, had been slain by the hands of BIMA. LAMBANA was attended by a whole army of *Butas*, who rushed upon the forces of GATOTKACHA—*Butas* like themselves. The conflict was mutual and the battle raged; demon contending against demon. LAMBANA himself encountering the King of *Purbaya*, was defeated and slain. The conqueror severing the head from the body, took the former and threw it in the direction of *Suyudana*, exclaiming, "O SUYUDANA here is the head of your relation." Soon the brother of LAMBANA, whose name was LEMBU-SAKTA, prepared to take revenge and discharged a flight of *Triputas*, which numerous as rain fell upon his adversaries; but the son of BIMA was not to be dismayed. He opposed the host of adverse *Butas*, and at length seizing upon their leader, he divided his head from his body and dashed it from him. Then advanced to battle with his demons the chief KALA-YUDA. He stormed with rage, still mindful of the death of his father.—His father KIRMIRA, an innocent victim, who had fallen by the hands of BIMA: GATOTKACHA soon put KALA-YUDA to the sword. Then, another *Buta* shouting, rushed into the battle. His name was KALA-SRANGI, in person of perfect beauty. BANDAN URAWAN, the son of ARJUNA, by DAWI-PALUPUSI, had fallen before by his hands. He joined the combatants without delay, but soon met his death from the King of *Purbaya*, who now routed the hostile demons in every direction, so that none remained to offer further resistance. KARNA alone encountered the son of BIMA and continued the battle—they contended with missile weapons—The flying forces of KARNA were pursued by the RAKSASAS of GATOTKACHA as an enraged elephant pursues the lion.—Such of the forces of the KURAWAS were taken prisoners, were forthwith dispatched. The fugitives could not be rallied, for the groans of the wounded and the noise of the feet of the runaways appalled the rest. Close pursued by the *Pandus*, the *Kurawas* were dispersed in every direction. Even more than terrified, they extinguished their torches for security. But the torches of the *Pandus* blazed forth, and they added to their own those dropt by the runaways. The torches of the victors seemed as if they would set the universe on fire, and consume their enemies in the flames.—KARNA deserted by his army stormed with anger. In his chariot he charged the son of BIMA in his, slew his driver, and disabled his horses.—The son of BIMA flew into the upper region, and sealing himself in the white clouds, no longer touched the firm earth. KARNA finding his foe had disappeared, was struck with dismay; confused, he discharged his countless darts, hardly knowing whither, some upwards some downwards, some to the right hand, some to the left, some to the front, and some to the rear.—Dreading an insidious attack and in anxious expectation of his enemy, he permitted not his eye to wink or to close.—At length KARNA heard the voice of the King of *Purbaya* from the clouds warning him to prepare himself.—As he descended, the sound grew louder and ended like a clap of thunder, adding terror to the field of battle.—The King of *Anganga* knew the sound, and calling aloud to his foe, challenged him to descend on the stable earth and meet him. GATOTKACHA in the midst of the clouds,

encreased his stature and magnified his bulk like the God KALATAKA who fills the universe.—Enraged, he raised his voice with a shout which seemed to shake the earth.—His aspect was terrible as that of RUDRA, threatening to crumble the world to atoms. He bent his bow and discharged a flaming arrow which illumined the firmament.—Again he increased his stature—bade defiance to his foe, and advancing upon him, attempted to sever his head from his body. KARNA, whose weapons were near expended, felt alarmed for his situation and said to himself, "I am destined to fall by the hands of the son of BIMA."—At length he had recourse to the divine weapon *Kunta*. He discharged the blazing dart at the son of BIMA, which entering his breast, transfixed his body.—The wound arrested the progress of the warrior; but recovering himself for a moment, he again advanced upon his foe, resolving he should perish with him. The descendant of the SUN eluded the blow by leaping from his chariot, and the King of *Prabaya* seizing upon the driver, dragged him along with him to the regions of the dead.—DURYODANA and the KŪRAWA rejoicing at what they beheld, set up a shout of exultation—not so the chiefs of the *Pandu* army; they turned pale at the sight, and with them all was lamentation.

NOTE BY THE SECRETARY.

THE Episode given above, by the author of the preceding paper, agrees generally with the same as it is narrated in the original *Mahabhárat* ascribed to VYÂSA, but it differs from that narrative in so many respects, that it can scarcely be called even a paraphrase of the *Sanscrit* Poem. It is more probably a translation of some other work of similar name and subject, as the Jaimini *Bhárata* for instance, which I am told is well known in the south of *India*, or it has been translated from a version into one of the local dialects, most of which possess a translation or paraphrase of the *Mahábhárat*. A slight description of the original will tend to corroborate these suggestions.

THE combat between the *Rácshasa*, GHAT'O'TCACHA, and the Prince CARN'A, in the course of a nocturnal engagement between the *Pán'd'ava* and *Cauravá* armies, is related in the *Drona Parba*, or the seventh canto of the *Mahábhárat*; the description is however much more detailed than in the *Cawi* poem, and extends through no fewer than 358 stanzas. Agreeably too to the general style of the *Sanscrit* poem, the story is thrown more into a dramatic or interlocutory form than appears to be adopted in the *Cawi* poem. The hero of this battle is CARN'A; he has committed great havock amongst the *Pán'd'ava* forces, and at the head of a portion of *Duryódhana's* army is on the point of gaining a decisive victory—when GHAT'O'TCACHA is instigated by CRĬSHN'A to endeavour to arrest his progress. The encouragement given him by CRĬSHN'A is repeated by ARJUNA and the *Ráchasa* proceeds to the encounter, vaunting and confident of success. CRĬSHN'A's compunctious feelings and attempt to repress his ardour, do not occur in the original. GHAT'O'TCACHA is first opposed by the son of JAT'ASURA, named in the *Sanscrit* indifferently ALAMBALA or JA'TASURI; the cause of quarrel and character of this enemy are similarly described in both works, and GHAT'O'TCACHA having defeated and decapitated him, presents his head, as described

ab e, to SUYO'DHANA, the same name, and the same person also as DURYO'DHANA, the chief of the *Curus*. In the *Sanscrit*, GHAT'O'T'CACHA addresses that Prince in nearly the same words as in the *Cawi*, and the commencement of this passage is the only one in which I have been able to detect a close approximation. "Here is your relation"—whose overthrow by me you have beheld—I shall soon return to you with the head of CARN'A for an offering, for" he adds, quoting a well-known text, "Priests, princes and women are not to be approached without a present;" the analogy in this case therefore being limited to the first three or four words. GHAT'O'T'CACHA then presses forward to encounter CARN'A, and a furious battle ensues between them and the forces under their command. CARN'A begins to recede, when another *Rácshasa*, named in the original ALAYUDHA, and in the *Kawi*, KALAYUDHA comes to his assistance, burning for revenge upon BHI'MA, the father of GHAT'O'T'CACHA who had formerly slain BACA, KI'MI'RA, and HIRIMBA, kindred RA'C'HASAS, and carried off HIRIMBA', the daughter of the latter. ALAYUDHA is first opposed at a disadvantage by BHI'MA, and the *Pa'n'd'ava* Princes hasten to his aid, but the demon still prevailing, CRI'SHN'A directs GHAT'O'T'CACHA to desist from following up his advantages against CARN'A, and to relieve the Princes contending with his fellow fiend. The disposition of the fight is accordingly changed and the two *Ra'cshasas* encounter each other whilst CARN'A is opposed by his PA'N'D'AVA brethren. None of which incidents are noticed in the translation of the *Cawi* composition. ALAYUDHA is slain by GHAT'O'T'CACHA who then resumes his attack upon CARN'A—after a sufficient portion of tumult and havock, and a plentiful expenditure of ammunition both human and divine, the conflict terminates in the death of CARN'A in a manner much the same as is described above—a compressed translation of this part of the poem, for it is impossible to do justice to the prolixity and reiteration of the original, will perhaps be regarded as the most satisfactory test of the resemblance or dissimilitude of the *Sanscrit* and *Cawi* poems, and I therefore subjoin it.

TRANSLATION.

SANJAYA.—When GHAT'O'T'CACHA found that CARN'A maintained the combat undismayed, he armed himself with a mighty shaft, and hurling it at the horses and charioteer of the Prince, slew them and instantly vanished into the air.

DHRITARA ASTRA.—Tell me then SANJAYA what befel my children, contending with so insidious a foe.

SANJAYA.—The disappearance of the RA'CSHASA filled all the sons of CURU with dismay, and they despaired of their valiant champion, exposed to combat with an invisible enemy; but the hero skilled in fight, scattered with prompt and unwearied hand his countless and pervading arrows—they filled the heavens as it were with a cloud, and spread such impenetrable gloom that GHAT'O'T'CACHA no longer beheld the movements of the Prince. Then, oh monarch! we saw in the sky a magick meteor of tremendous and infernal form, glowing with red and fiery splendour, and darting blazing torches

and vivid lightning all around. We heard a clamour loud as a thousand drums, and there fell a mingled and incessant shower of arrows, darts, maces and battle axes: swords edged with flame: javelins with a hundred points: scorching rockets, massive mountains, loud crashing thunderbolts, and discusses with a hundred spires burning as they whirled along. The shafts of CARN'A encountered the storm in vain, and then arose the cries of dying elephants and horses, the crash of chariots and the groans of men. The troops of DURYODHANA stood appalled at the sight; their spirits sunk within them, and disorder spread throughout their ranks, but awe of DRO'NA for a while suppressed their panick, and the bravest combatants maintained the fight.

THE shower of weapons still continued, and the broken ranks were assailed by howling Jackalls eager to prey upon our falling troops—then rushed forward a host of fiends with tongues of fire and empurpled teeth—in size like mountains they moved along, and as they advanced they overwhelmed the army with a fresh deluge of mighty and destructive weapons. Horses, elephants and chariots sunk beneath the hurricane, and the bravest heroes lay mangled and breathless on the plain. The *Cauravas* fled, exclaiming, "*Indra* and the *Gods* fight for our foes."

SUCH was the general confusion that friends and enemies know not each other, and the sons of CURU and PA'NDU, mingled terror-struck indiscriminately together. Dread was the darkness—the four quarters of the world were alike undiscernible, and the illusory combustion of the sky alone illumined the scene. Then I beheld CARN'A undaunted and alone, receiving the shower of super-natural weapons on his breast, and launching his mighty shafts at once at the phantom and the fiend. Burning with shame at the prospect of defeat, and prepared to encounter with fortitude every change of fate. The chiefs of *Sindhu* and *Va'hlica* witnessing CARN'A's untameable resolution, did him homage, auguring from it the final discomfiture of the RA'CHASA. The combat continued and CHATO'TCACHA discharged a rocket set round with discusses, which killed CARN'A's four horses at once. The *Cauravas* seeing him on the ground and exposed to perish, now thought the moment arrived, when he should have recourse to the weapon that could alone triumph over such super-human and hostile arms.

THEY therefore addressed him, "Destroy, oh CARN'A! the demon, kill him with the fatal shaft, or the race of CURU is no more. What fear is there of BHI'MA or ARJUNA, that this RACHASA should not be slain. If he escape not, CARN'A will still lead us to victory against the sons of CUNTI: kill him with the shaft, the boon of *Indra*. Save your allies before this interminable night shall further be prolonged, for every hour it lasts our mortal rigour wanes, whilst the RACHASA derives new strength and prowess from its duration."

HAVING heard the general cry of the *Cauravas*, CARN'A consented to hurl the mighty weapon. Fierce as a raging lion he resolved to end the conflict at a blow, and seal with the dart *Vaijayanti* the

fate of GHATÓTCACHA. Long had he reserved this beauteous and splendid dart; the gift of INDRA, in exchange for the breast-plate and ear-rings of his birth, and created for the destruction of ARJUNA. Fleet was the strong-girt arrow in its flight, tremulous like the tongue of a wild elephant, and fatal as the sister of death. When CARN'A raised the weapon the RAC'SHASA knew his peril, and bulky as the *Vind'ya* mountain prepared to fly. CARN'A raised it with both his hands: the etherial beings shouted aloud, the winds roared and pealing thunders shook the heavens. The arrow reduced the Phantom to ashes, and piercing the heart of GHATÓTCACHA forced a passage through his body, and then winging its glittering course aloft, took its place amongst the constellations: with battered arms and mangled body, darkling as a cloud or mountain, precipitous the monster fell; but ere he reached the ground he made a last expiring effort for his *Pand'ava* allies, and expanding his enormous bulk he covered, and crushed on his descent a division of our forces, thus faithful to his friends even in his death. Then shouted our chiefs and the drums and clarions echoed the sound. The *Cauravas* hastened to behold their champion, and CARN'A was lauded by our host as was INDRA by the *Márute* on his victory over VRITRA'SUR. Then they brought your son in triumph to the field rejoicing in the fall of his foes. The PAN'A'VAS witnessing GHATÓTCACHA like a fallen mountain prostrate on the earth were filled with sorrow and dismay, and their eyes were suffused with tears.

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III.

ACCOUNT OF A JOURNEY,

TO THE

Sources of the Jumna and Bhagirathi Rivers.

By JAMES B. FRASER.

Communicated by the Most Noble the PRESIDENT.

ON the 24th of June, my * brother having received the orders of Government to proceed to *Gerwhal*, we left *Seran*, † (the residence of the young Rajah of *Bisehar*) where for some days we had remained in expectation of instructions.—And crossing that portion of the roots of the snowy mountains whence ‡ *Moral-Ca-Canda* range arises, and keeping our course down through the valley of *Sambracot*, we reached the banks of the river *Puber*, and encamped on the right bank, opposite to the fort of *Raingerh*, where for some days we were detained by the difficulty of procuring carriage for our necessary baggage, on the route to *Sirinagar*. On the 5th of July, we left *Raingerh*, and kept down-

* William Fraser, First Assistant, Delhi Residency.

† *Seran* is situated in the glen through which the river *Setlej* flows; about 3 miles above its stream upon the mountain side.

‡ *Moral-Ca Canda* is a large and very noble mountain which stretches in a continuous but irregular range, and under various names, from the snowy mountains above *Rempur* and *Seran*, quite down to *Irki*. It is an interesting range, because it is that which divides the waters of upper *Hindostan*. All these rising from its eastern side, flowing through the *Girri*, *Puber*, *Tonse* and *Jumna*, into the *Ganges* and the bay of *Bengal*, while those from the western aspect, run by the *Setlej* and *Indus*, into the *Indian* ocean.

ward along the courſe of the *Paber* till its junction with the *Tonſe*, and then followed that river, croſſing it by a bridge of ropes, nearly to the ſpot where it is met by the *Loha Cundí* range, which we croſſed conſiderably to the northward of its ſtream, and on the 9th July we reached the village *Cot'ha*, ſituated on the right bank of the river *Jumna* about 2 miles above its bed. The fort of * *Jauntgerh* is not far diſtant on the oppoſite ſide, and the road to *Sirinagar* croſſes the river a little way below the village.

As I had much anxiety to viſit *Jumnotri* and *Gángotri*, the ſources of the rivers *Jumna* and *Ganges*, (or rather of the *Bhagirathi*, the principal ſacred ſource of the Ganges) places of peculiar ſanctity to the *Hindus*; I profited by an opportunity better than could ever again occur, and parting from my brother, who purſued his way to *Sirinagar*, took, with as few attendants as was conſiſtent with prudence and neceſſary comfort, the road which leads to the firſt mentioned place.

10*th July*.—LEFT † *Cotha* paſt 9 o'clock, the road winding in a general direction to N. E., following the deep indentings of the ravines and valleys, that furrow the mountain ſide and pour their ſtreams into the *Jumna*, which winds far below; ſometimes it is varied by ſharp aſcents and deſcents, but keeps nearly on a level till we reach a paſs or gorge, named *Chamri-Cí-Dhar*, the end of a lofty range that coming in a weſtward direction continuous from *Buruſtli-Cí-Dhár*, ends in the *Jumna*. On our way to this point we paſſed through one or two villages, but the cultivation is neither extenſive nor promiſing. From this ſtation an extenſive view would have been obtained including *Birat*, *Badra*, and ſeveral of the hills above the *Dehra Dún*, as well as the extenſive

* *Jauntgerh* is the place to which BHULBUDDER SING retreated after the evacuation of *Kalunga*, and from whence Major BALDOCK was repulſed by him.

† From *Cotha*, we had bearings of *Jaunt*, *Birat* and *Badráj*.

range, on which *Jauntgurh* is ſituated, with a general view of the courſe of the *Jumna*, from the ſnowy mountains to *Calſi*; but this was prevented by a thick fog which enveloped the tops of the mountains, and only now and then gave to view a peak, glimmering through miſt. From hence we entered on a very deep deſcent into the bed of a ſmall but rapid ſtream, called *Got'har-Ca'-Ga'd'h*. The valley or hollow of which this forms the drain, is ſingularly formed by the meeting of two hills, or ranges by a ſmall ridge, no great diſtance from the river; and the mouth is far more narrow than the hollow above. It contains the *Bander-C'hat*, (or diviſion) and there is a conſiderable quantity of detatched cultivation, wheat, barley, rice, cotton, and a grain, called **China*, reſembling bird-ſeed, ſcattered through it; the rice here as in other parts of the hills is neatly cultivated on levelled ledges, over which water is led in ſmall courſes, taken from the ſtream far above. It is a wild and rugged ravine, and the hills riſe very ſuddenly to their height.

THE deſcent from *Chamri-Ca-G'hat* is very irregular, and zig-zag, ſevere and painful; paſſing through *Cot'hal*, a village deſtroyed by the *Gorc'has*; we croſſed the *Got'har* nullah, and reached the village of *Lak'ha Man'dal*, ſituated almoſt on the banks of the river. This village is claimed both by *Gerwhal* and *Sirmor*; it cultivates the lands of each ſtate, and pays tribute to both; it ſeems entirely appropriated to the maintenance of ſeveral temples, and their prieſts, and there are ſome fine rich pieces of land on the banks of the *Jumna*, as well as of a nullah, a ſhort way further on, ſet aſide for this holy purpoſe; for which the village is aſſeſſed by each ſtate. There is a neat temple to SIVA, a place of worſhip to the five brothers, BHI'M SEN, ARJUN, YUDHISHT'HIR, SAHADEO, NACULA, known by the name of the *Pandawan*, a temple to *Bairam*, one to *Paraſuram*, and an old ruined one to MAHA DEO, under the name of

* *Panicum miliaceum.*

Cédar, with some curiously carved stones representing the *Hindu* deities; two figures in stone representing ARJUN and BHIMSE'N, are remarkably well executed, but their faces have been defaced, it is said by the *Rohillas*, in an incursion of old into the hills. One curious stone represents in relief a large assemblage of *Hindu* divinities, among whom GANE'SA, DURGA, BHAVA'NI &c. &c. were readily recognised. A narrow cavern leading under ground through the rock from the village to the river side, used, it is said, by the people of the country in times of danger, was shewn us, but we did not explore it.

OPPOSITE to this village, *Barni-Ci-Ga'd'h*, a large stream which has its rise in the lofty peak of *Bongi-Ca-Tiba* debouches into the *Jumna*. In the *Ravine* we observed a curiously situated house, or fort, built upon a small rocky eminence, quite insulated in the middle of the stream. Its name was *Biraltu*; and it belonged to a zemindar of some consequence, BHU'V SINH.

OUR route now lay along some table land just on the river bank: passing *Bandergerri*, a ruined fort on a small rising ground above the road, we descended to *Necrál-Ci-Gad'h*, which stream is said to be the boundary between *Gerwhal* and *Sirmor*; but there appears to be a sort of land debateable around *Lakha-mandal*, which contains some spots of land, far richer than that generally met within the hills. *Necral-Ci-Ga'dh* is very considerable, and is said to take its rise in *T'hiran-Ca-Tiba*, nearly two days journey to the N. W.; its immediate banks are rocky and wooded, and much fine alder wood grows on them, as well as on those of the *Jumna*.

AFTER a sharp ascent up a bare rocky hill, a rough path along its face brought us to *Bam'hauli*, a large and apparently populous village, high above the river, and where we rested for the night. The place of

repoſe given us was in a ſquare, incloſed with a high wall, containing a temple to *Maha' Deo*, who, as we approach the ſacred places, and the wild ſnowy peaks, his peculiar reſidence, is worſhipped with almoſt exclusive devotion; the temple was neat, much in the ſame ſtyle as thoſe uſually met with among the hills, with *Chineſe* over hanging roofs, much carved wood work; and the doors covered with carved braſs. The village has the appearance of having once been more conſiderable; the chief zemindar or *Sqana'* (as he is called) when queſtioned with regard to its population, averred that it had but 28 houſes, and might contain about 100 inhabitants; but his anſwers were heſitating, obſcure and prevaricating; and I ſuſpect he believed that the queſtions put were preparatory to ſome aſſeſſment or tax, which prevented the truth from being told. I ſhould have thought the village muſt have contained full 250 inhabitants; it is not exactly a part of any purgunnah, but in ſome meaſure is attached to *Rewaen*.

'AT 7 o'clock next morning we left *Banc'hauli'*, and proceeded ſtill along the left hand face of the hill above the *Jumna*, following the deep indentings, and long rounds of the vallies, with various irregular aſcents and deſcents, till, by a very rough and clambering path, we reached the top of *Gangani-Ca-Dha'r*, in a point called *Gangani-Ca G'hat*. This balcony is very highly elevated, and commands both upwards and downwards, a moſt extenſive and noble view, though partially obſcured by clouds. From hence we obtained the firſt diſtinct view of *Bender Puch'h*, the mountain, from a part of which the *Jumna* has its riſe; it ſhews in two grand peaks, both very white in ſnow, and of great magnitude and height. The bed of the *Jumna* looking downwards, is narrow, deep and rocky, ſave where the few green ſpots around *Lakha mandal*, relieve the eye; upwards it runs in a far more fertile country, with table land and cultivation on its banks and ſeveral villages; while the hills ſlope more eaſily down to the level part, co-

vered with a variety of foreſt ſcenery, and ſpotted with fields. Further up they frown and cloſe, and are of darker-hue beyond, and above all *Jamnotri* towers above the clouds.

A ROCKY, tangled and unfrequented path brought us to a further *ghat* or paſs, where information was given, that a valley of conſiderable magnitude lay to our left, ſtretching from the *Jumna* to the weſtward, and in hopes of ſeeing ſo unuſual a thing in theſe rugged hills, we left the road to make the trial. We were however diſappointed upon reaching the ridge, whence it was thought it might be ſeen, nothing appeared, ſave the lower part of a ravine entirely of the ſame nature as the reſt of the country, and which has here the name of *Sa'ri-Gari-Cí-Gad'h*. Above it is called *Ráma Serai*, and I obtained only the following particulars deſcriptive of the place.

THE old and ruined fortreſs called *Sircot*, is ſituated on a high *Tiba*, of the ſame name, at the end of the lofty range *Ce'dar-Canta*, which ſtretches down from one ſhoulder of *Bender Puch'h*, two or three cos further up in this mountain; the ſtream, *Rama*, has its ſource at a ſpot called *Shealu*, and is joined by ſeveral others from the ſides of this as well as from *Sircot*, and from the range which forms the other ſide of the vally, called *Renai-Cí-Dhar*. Juſt at the end of this laſt mentioned range, which was in view from the point we ſtood on, the valley of *Ráma Serai* commences, and runs up to *Sircot* for a diſtance of from 5 to 7 cos, probably about 9 miles; the direction, judging from that of the mountains, and poſition of the points we ſee, along with their formation given, may be nearly N. E. and S. W. The breadth from 1 mile to 2½, and it is level throughout.

FORMERLY this valley, which contains one *t'hat* or diviſion, was well cultivated, and contained many populous villages; now like the re-

Gerwhal it has fallen much to decay, and four half ruined hamlets alone remain; theſe are *Gundiat*, *Perál*, *Cimola*, and *Celar*; the two former are near the head of the plain. The whole forms a part of the diſtrict or *purgunnah* of *Rewaen*, and had been given by the late *Raja* PARDUMAN SAH, to his brother PRIT'HUM SAH, who lived for 6 or 7 years in ſeveral parts of it; his chief reſidence, however, was at *Gundiat*. The *Raja* himſelf frequently came here with his brothers to hawk in the valley; they rode upon *Gounts*, or *Bhotia* poneys, and killed partridges, which are there abundant.

FROM the foot of *Sircot* proceeds another ſtream which runs in a valley, named *Gadu-Gá'h*, and which, after a courſe of about 6 miles, joins the *Tonſe*, nearly the ſame diſtance above *Anhul*. This is alſo ſaid to be a fine level, and formerly well cultivated valley, from ½ to a mile and half wide; but far inferior to *Ráma Seráí*, which ſeems to be allowed the largeſt and fineſt in the whole country, excepting the *Dún*, and to have been conſidered a place of delightful retirement for the court in the days of the greatneſs of *Gerwhál*.

REGAINING the road, and paſſing through the ruined village of *Thalli*, we deſcended a ſteep rocky path, very irregular and zig zag, to the bed of *Sárigárí-Gá'h*. The mouth, through which the water has forcibly worn its way between oppoſing rocks, is narrow, and has probably yielded to the force of torrents much ſlower than the ſoil of the rocks behind, which may, in ſome meaſure, perhaps, account for the ſingularly different nature of *Ráma Seráí* valley from thoſe ravines which univerſally divide the hills. The ſtream is a fine copious one.

THE rock here, as well as that we have to-day deſcended, is principally lime-ſtone, very hard above, and mixed with ſand ſtone. That

about the village of *Banc'haulf*, and met with in our aſcent to *Gangáni-Ci-Dhar*, is alſo lime ſtone under various ſhapes; among others is a curious concretion, to all appearance like the irregular maſſes of mortar and gravel found in the walls of old buildings; ſometimes it was of great hardneſs and in large maſſes, at others, as if only forming into them. Common and micaceous ſlate are alſo met with, and a very white ſoft ſilvery earth, that feels ſoapy between the fingers. The top of *Gangáni-Ci-Dhár* exhibits a ſingular appearance; totally denuded of ſoil, the rock is cut into ſtrange forms and fiſſures by the action of ſtorms:—it is a compound of ſand and lime-ſtone, and where there is little of the laſt to bind and harden the former, the violence of the weather has worn it away.

FROM hence, the road winds pretty conſtantly along the river bank: the heat was exceſſive both in our deſcent, and in the low grounds. A few miles onwards we paſſed *Maungral-Gerh*, an old ruin, which ſtands on a peninſular rock, from 150 to 200 feet high, boldly projecting into the river; it was lately occupied by DHAMAN CHAND, AHMED SINH, and DAULAT SINH, who were the *Rotillas* of the *Raja* of *Gerwhal*. The term *Rotilla*, as far as I could underſtand, is applied to a ſon of the *Raja*, born of a ſlave woman; and this reſidence was entirely appropriated to theſe connections of the royal family; it appears to have been of conſiderable extent, but conſtructed much like the uſual houſes of the ſmall *T'hácúrs* we have ſeen in our tour; it is now however in ruins, having been burnt three years ago by ſome diſcontented *zemindars*. Juſt above this place, the remains of a *Sango*, or Bridge, which kept up communication with the village near *Maungral-Gerh*, are yet viſible.

WE paſſed ſeveral villages—*Iſhna* and *Bercot* on the eaſtern ſide, and *Pot'hi* (ruined) with *Sunaldi* (a ſingle houſe) on the weſtern or right bank: and ſaw the *debouches* of ſeveral conſiderable ſtreams

flowing from the *Baugi* and *Sucral* mountains; and croſſed *Bénál-Ci-Gád'h*, a large ſtream, which has its riſe in *Sarutál-Ca-Tiba*, about ſeven *cos* hence.

THERE is a great deal of fine rice cultivation in the lower part of this valley, which is flat and rich; at the time we paſſed it, the *zemindars*, their women and children, were buſily employed in planting rice, and were cheered in their labour by a rude band of ſinging and dancing men with their inſtruments; who proceeded forthwith to ſalute and welcome the ſtrangers. The natives are remarkably partial to this uncouth amuſement, and ſingers and dancers are met with in every village. Here the villagers appeared very numerous, and were particularly ſavage and wild in their appearance, both men and women laughing like idcots as we paſſed.

A SHARP aſcent up the end of *Dhúlu Dhar*, and a ſhort progreſs along its face brought us to the village of *Duckheat*, our ſtation for the night. It is neat and of conſiderable ſize, and is one of ſeveral in this valley that form the chief part of the *Benal T'hat*. From here too we enjoy a good view up the *Benal* valley, which, though not very level, is remarkably well cultivated; much rain fell this evening, and our quarters were not the moſt comfortable.

HERE ſeveral * *Gorc'ha* ſoldiers joined us, to all appearance in a very wretched ſtate, and ſolicited ſervice, at all events protection, from the

* IT was usual, during the Government of that people, to ſtation parties in the different diſtricts, for the purpoſe of collecting the revenue; and in progreſs of time, many of them took daughters of the *zemindars* in marriage, not always with the good will of the latter, but the connexion formed a tie between the conquerors and conquered, which, though far weaker from the ſavage and treacherous nature of the people, than a ſimilar one in moſt other countries would have been, was ſtill ſufficient during its exiſtence to guarantee life, and prevent the murder of the Son-in-law.

WHEN the power of the *Gorc'has* was broken, and their troops were taken priſoners or ſcattered, thoſe, in the further diſtricts thus connected, choſe rather to domeſticate with their wives and families, than run the hazard of retreating through a country of hoſtile ſavages, ripe for revenge on a tyrannical

violence they dreaded from the natives, should they be left in the hills after the English might quit them; they excused themselves from attending us to *Gangotri*, on the plea of want of arms and cloaths, which we could not supply them with; probably, they were not desirous of a long and fatiguing journey, they therefore were dispatched with a note to my brother at *Sirinagar*, with a few sepoys, in the service of the *Fauj-Dar* of *Rewaen*, as a protection from insult or harm.

July 12*th*.—This morning we were joined by Govind Sing Bhisht, the chief, or *Fauj-Dar Rewaen*, who came to accompany and conduct us through the district under his direction; he is a man of high cast, and considerable consequence, and has had the entire administration of the extensive *purgunnah* of *Rewaen*; in fact, he has of late been more like an independent Prince, than a governor; for, in so impracticable a country, he could not easily be called to strict account, either by the Rájá or his conquerors; he had also been on good terms with the *Gorc'ha* chiefs, owing, we understood, much of consequence, to

and fallen master. Others too, in like manner, though not enjoying the security resulting from any such tie, chose rather to trust to the protection of some *zemindar*, whom they might have known and perhaps obliged, and by whom they believed their lives would not be attacked, than stake their safety on a more dangerous flight, though loss of property in either case was certain.

Thus, individuals of this wretched people were found in every district of the hills, and every one stript of his property, even to the necessary cloths to cover them from the weather. Many were still more deplorably situated; some, wounded and neglected, were languishing unassisted, in want even of necessaries; others had fled to the *jungles*, to escape the massacre their comrades fell victims to, and had for a long time subsisted on roots and fruits. Even the marriage tie did not always ensure good treatment; and not unfrequently, when the terror of consequences ceased, the *zemindars* reclaimed their daughters, and forced them to leave their husbands, although the stipulated prices had been paid them. Several curious cases were referred to us for decision, in which, of course, nothing could be done, but to leave the matter to the uninfluenced decision of the lady herself; and it must be said, that where the contract *was* broken, it generally appeared that the loss of the money, the price of the female, (from 12 to 16 Rupees,) was the most grievous part of the injury. *That*, they never will restore, arguing, that the contract had been originally made in great measure by force on the *Gorc'ha*s, and that one or two years' possession was sufficient to cancel it, provided it was the woman's will so to do. Many however of these women left their families and country, and followed the men with their *Gorc'ha* lords, perfectly voluntarily, and appeared not only fully equal to the fatigue of the march, but were of the greatest use to their husbands, occasionally carrying their children, and always cooking their meals, when arrived at the evening's ground.

them; he is a fine looking man, far superior in appearance to the people of the hills; who, in fact, pay him much respect, and seem quite devoted to him.

We ascended the end of *Dhul'ti Dhar*, and crossed it, and reached the banks of *Bediar-Ga'd'h*, a large rapid stream, in size nearly equal to the *Giri*; which has its rise in a high peak, called *Bandarpu'ch*; we crossed it on a very ugly bridge, called *Shelli-ca-Sango*, consisting of two pine-trees of no very large size, thrown over a deep chasm, in which, far below, the river runs with great violence and which being slippery, gave but uncertain footing; at the top of a short rocky ascent above this bridge, we reached the village *Nagwa'n*, which is of respectable size, and which gives name to a *t'hat* or division; here is one of GOVIND B'HISHT's residences; it was once a populous and tolerably cultivated division; but most of its villages are now in ruins: five are still inhabited besides itself—*Palu*, *Sheal'wa*, *Cu'rsala*, *T'han*, and *Phuldar*.

THE opposite side of the river is desolate and uncultivated, though the ruins of several villages are perceptible. The *Patrain Nalah*, nearly opposite, contains much level land, all now waste.

JUST opposite the mouth of *Bediar-Gad'h*, there is a bridge across the *Jumna*, and on the other side, in a rock at the foot of the hill, in the bed of the river, is shewn a spring of water, which they say is of the waters of the *Bhagirat'hi*, and of which the following tale is told:

THERE yet exists near this a place of worship sacred to *Maha' Deo*, in which, in the old time, a Brahmin of great sanctity used to reside. This holy person every day went to the *Bhagirat'hi*, said to be a full day's journey from hence, to perform his ablutions in its sacred stream, till

great age rendered this exercise impossible, when he prayed that some means might be afforded him of continuing this act of devotion; his prayer was heard, and he was desired to drop his handkerchief in the *Bhagirat'hi*, and whereever that should appear on the *Jumna* banks, there to wash in full confidence of that being of the waters of the holy stream.

THE Brahmin is gone, but the waters retain their sanctity in the estimation of the country, which confidently believes they are the effect of a miracle; a miracle ingenuously and successfully contrived, to continue to laziness or inability, the odour of sanctity derived from penance, without its pains.

FROM *Nagwár* we ascended at times rapidly, at times gently, through thin fir-wood; and this gently rising country quite waste, but once cultivated, and all capable of being so, to the village of *Sheálwa*, much gone to decay.

CROSSING the *Cú'rsala* valley, in which is the village of that name, we climbed a steep ascent to the gorge of a pass, called *Candi-ca G'hat*, in a ridge continuous dome from a high peak, named *Tunal*. From this point, a water-fall below a mass of snow in the *Benderpuch'h* mountain, is very plainly seen, which we are informed is *Jumnotrí*; it did not appear more than a long day's journey from us.

THROUGH a various wood of oaks, firs, rhododendron, &c. along the face of the hill, high above the river, we reached the point where commences our descent to *Pá'liá-Gá'd'h*, which forms the outlet to the w[illegible] of one of the most terrific and gloomy valleys I have ever seen. [illegible] lofty peak *Bachu'ncha* stretches a rugged ridge to the southward [illegible] joins *Tunal*, (the lower part of which we crossed,) and by the [illegible]

is formed the hollow of *Cot'ha*, the chief ravine of which runs down from nearly the top of *Bachu'ncha*, and is joined by ſmaller but equally rough cleſts from the back, which unite their waters below, and roll a rapid and large torrent to the *Jumna*.

"On one of theſe ravines, are ſeen ſmall hills of ſtones, reſembling places of worſhip; ſuppoſed to be the reſidence of *devatas* or *ſpirits*, who amuſe themſelves with inveigling away human beings to their wild abodes. It is ſaid, that beauty in either ſex is the object of their particular predilection; that they remorſeleſsly ſeize on any, whom chance or imprudence may place within their power, and whoſe ſpirits become as theirs, when deprived of their corporeal frame; many inſtances of ſuch occurrences were given: on one occaſion, a young man who had wandered near their haunts, being carried in a trance to the valley, heard the voice of his own father, who ſome years before had been ſpirited away, and who now recogniſed his ſon. Paternal affection it appears was ſtronger than the ſpell he was bound by, and inſtead of rejoicing at the acquiſition of new prey, he recollected the forlorn ſtate of his family, thus deprived of their only remaining ſupport; he begged and obtained the pardon of his ſon, who was diſmiſſed with an injunction of ſtrict ſilence and ſecrecy; forgetting however his vow, he was deprived of ſpeech; and as a ſelf-puniſhment, he cut out his tongue with his own hand. This man, it was ſaid, was ſtill alive, and I deſired he ſhould be brought to me; but he never came, and I was afterwards told, he had lately died.

Several perſons have approached the precincts of theſe ſpirits, and they who have returned have generally expreſſed the ſame feelings; and have uttered ſome propheſy; they aver, that they fall into a ſwoon, and between ſleeping and waking, hear a converſation, or rather

are ſenſible of impreſſions, as if a converſation had paſſed, which generally relates to ſome future event. Indeed this prophetic faculty is one of the chiefly remarkable attributes of the place. The officiating Brahmins, ſometimes venture further than the vulgar, and are favoured with communications of future import. It is ſaid they foretold the misfortunes and death of the late Raja PARDUMAN SAH; the loſs of his kingdom and life at *Dehra Dún*, and the commencement or rather completion of the *Gorkha Raj*. The awe and horror which the natives entertain for this place, is great and remarkable. They aſſert the impoſſibility of penetrating the valley to any conſiderable height, and that none, who had attempted it, ever returned without the loſs of reaſon. I believe the phyſical obſtacles to aſcending the hill would be enough to prevent ſucceſs.

July 13*th*.—From the nullah (which is croſſed by a ſingle ſtick) we roſe to the village of *Pália*, where we reſted for the night, and which is ſituated above the nullah called *Pália Gadh*, and not far below the gorge of the glen of *Cothia*. It is neat and clean and of conſiderable ſize, and has leſs the appearance of decay than moſt of thoſe we have paſſed, but is not ſo thriving or large as *Duckheat*, our laſt night's ſtation; it is ſurrounded by a few fields and ledges of cultivation which occupy the remainder of the ſpot on which the village ſtands, but they are of no great extent, nor is there any more near at hand; we took notice, that many of the inhabitants were particularly fair, and they were fine ſtout looking men. The ſcenery in this day's march has aſſumed a character far more ſavage than we have remarked in any part of our tour; there is leſs wood more rock, and the mountains riſe more ſuddenly to their height, without affording the poſſibility of cultivation, even in the narrowest ledges; the weather too is darker, and the rain which all day

threatened, fell with loud burſts of thunder, which was awfully reverberated from rock to rock: and, during the night, more than once the ſound was heard of fragments from the brows of the mountains craſhing down to the depths below; our quarters were good, in a temple, neat and clean, and ſecure from the weather.

We left *Pália* with a fine morning, after a rainy night; following the *Pália Gád'h* nearly to its mouth, we turned to our left and followed our courſe as before, up the river ſide, aſcending till the path was from 2 to 300 yards above its ſtream; the road hence is very bad, to *Áſari Gád'h*, a ſmall ſtream, that riſes from one of the ſmaller peaks of *Bachunchu;* at its mouth there is a peninſulated rock of conſiderable height, on which there is an old fort, called *Áſari Gerh;* the rock is connected with the mountains over-hanging the river by a low neck of land, which is cultivated. At the bottom of the rock, and in the bed of the river, there are ſeveral ſmall ſprings of hot-water, which we went to ſee; ſome of theſe ſources, we obſerved, aroſe with conſiderable force from the ſurface of the earth, quite cloſe to the ſolid rock, giving a ſtream of 3 or 4 fingers thickneſs, and much came trickling down from between the *lamina* of the rock, of which the hill is formed. Theſe *lamina* are in large white flakes, and conſiſt, I believe, entirely of quartz; they form an angle of about 65 to 70, with the plane of the horizon. The water is beautifully clear, it is more than blood-warm, and is ſtrongly impregnated with acid: it has much of the ſmell common to ſulphureous ſprings, and is probably impregnated with this ſubſtance, and with iron; for the rocks around were tinged and incruſted with a red matter, reſembling ruſt of iron mixed with clay or lime. Quite cloſe to the warm ſprings, and in the ſtream they form, a cold one bubbles up, but the mixture is ſo immediate, that it is impoſſible to ſay, whether the acid, which it alſo contains, is communicated from the warm water:

its ſmell and taſte, however, reſembled the other, and around its ſource upon the rock, there was a collection of ſcum, formed of green ſlime, and the red concretion, before mentioned; this was found in their united ſtream, until they reached the river; from the manner in which this water iſſues from the rock, it would ſeem, that its ſource muſt be in the body of the rock above, but there is no other appearance whatever to lead to a conjecture reſpecting its formation; in the courſe of the *Jumna*, however, there are many ſuch ſprings of warm water.

A ROUGH aſcent and deſcent brought us to a bridge, which, about a mile from *Aſuri Geik*, croſſes the *Jumna*, here diminiſhed to a ſmall but rapid torrent. The bridge is laid from one large ſtone to another acroſs a chaſm, about 15 to 16 feet broad, through which the ſtream flows with a violence that would quickly prove fatal to any one falling into it. Hence the road riſes on the left bank of the river, and paſſes through the ſmall and poor village of *Terkela*, and among ſcattered and ragged fields of cultivation, to the village of *Cuphera*, which has been a large and populous place, but is now in lamentable decay. There is here a temple to VISHNU, under the name of NÁG RÁJÁ; and we found the villagers preparing to carry the image, with ſongs and dancing, to be bathed at *Jumnotri*, an annual ceremony. Here the hills about the river open out a little, though there is little cultivation or room for any. *Pálla* is almoſt the higheſt village on the oppoſite or right bank, and the whole tract between the *Jumna* and *Tonſe*, ſaid to be a ſpace of 30* cos, is a wild and ſavage heap of rocky barren peaks, and dark impervious ravines. On the *Tonſe*, however, even near to its ſource, there are many villages, and a good deal of land under culture. The diſtance between the *Jumna* and *Bhágirathi*,

* This diſtance is in all probability much exaggerated. I have uniformly found diſtances meaſured by report frequently to bear double the truth, eſpecially when the road was difficult: the true perhaps does not exceed 25 miles horizontal diſtance—nay, probably is much leſs.

at this point, is ſaid not to exceed one day's journey; but from *Curſalì*, the neareſt village to *Jumnotrì*, the country, from the one river acroſs to the other, we are told is very difficult, and the road much longer; three days' journey, through a country in which there are no inhabitants, nor any ſupplies procurable, forming a part of it. This, however, we believed to be exaggerated, as our guides appear quite afraid of the difficulties of the hills, and delight in communicating their alarm, and throwing all obſtacles in our way.

PURSUING our way along ridges of abandoned cultivation, we croſſed the *Changhal-cí-Gád'h;* the banks of which are dangerous on either ſide, and one ſtep is particularly ſo, as the path leads over a narrow ledge of rock, over which another projects, leaving a height ſo inſufficient, as to render it neceſſary to creep on all fours, to paſs through the precipice. A circuitous deſcent brought us to the village *Curſalì*, chiefly in ruins; and a road ſimilar to that we have of late been uſed to, brought us to *Ráná*, the village where we are to remain during the night; it has been a very ſhort day's journey, and the reaſon given, was, that no reſting place for the night intervenes between this village and that of *Curſalì*, which was ſtated to be 8 *cos* diſtant, and forms one day's work of itſelf.

IMMEDIATELY oppoſite to this village, there is ſeen the remains of one very wildly ſituated on the brow of a precipice overhanging the *Jumna*, fully one thouſand feet in height. There is a very curious winding path-way down its face to the river bed; its name is *Cochar*, and I believe it was, and remains little better than a den of thieves.

July 14th.—A PATH, very ſimilar to that of yeſterday, led us through the ruined village of *Baria* to the confluence of two ſtreams, the *Dá-can-cí Gád'h* and the *Bhím-cí-Gád'h*; the former a ſmall one, the latter

is large and rapid, and little inferior in size to the *Jumna*; it rises in a range, we are told, that springs from *Suméru Parbat*, and we cross it on our way to *Gangotrì*. A steep ascent at first up a bare hill, and afterwards through a fine old forest, and huge fragments of rock, brought us to an open space, on the northern side of a ridge just facing *Benderpúch'h*. From this point, we enjoyed a far more perfect view of this great mountain than we have had, or than was likely to occur again, and, though our close vicinity to it, and comparatively low situation, act unfavourably for displaying the full height, it still appears prodigious.

Two lofty and massy peaks rise high above the rest, deep in snow, from which all the inferior ridges appear to take their rise; they are connected low down by a sharp neck; their South and S. E. exposure is the least steep, and bears a great depth of pure unbroken snow; little or no rock is seen, except at a few points in the ridge connecting the peaks, where it is too sharp and steep for snow to lay, and here it appears of a red colour; here and there, lofty precipices are observed in the snow itself, where the lower parts have melted and the upper masses have given way, sliding down to the ravines below, leaving a face of snow several hundred feet high, and shewing the depth of that which has accumulated for ages.

THE formation and course of the valley we have journeyed thro', and the direction of the ridges, as they break off from this great centre, are from hence finely traceable. From a point of our right, as we look towards the mountain, a ridge strikes off to the south and west, and ends nearly at the junction of *Bhim-ci-Gád'h*, with the *Jumna*; this ridge is called *Cailaru*; to the west of this, in our front, another large mass runs down, called *Dumancandi*, and forms between itself and the *Cailaru*, a basin whence runs a large stream called the *Cá[illegible]*

Gunga. Further to the weſtward and conſiderably to our left, a range conſiſting of many high and irregular maſſes, takes its immediate riſe from *Damini Matha* (a continuation of *Benderpúch'h*) and forms the weſtern ſide of the valley, cloſing up the view; between this range, and *Dumancandi*, the *Jumna* is formed, from many ſources in the ſnow. The *Vinta gunga* unites at the point of a level piece of land which ſtretches from the foot of *Dumancandi*; which latter range forms thus the diviſion between the two baſons, and rivers, which are nearly of equal ſize.

THE name of *Benderpúch'h* properly applies, only to the higheſt peaks of this mountain; all the ſubordinate maſſes have names independent; *Jumnotri* has reference ſolely to the ſacred ſpot, where worſhip to the goddeſs, is performed.

THOUGH only two are ſeen, the top of *Benderpúch'h* is ſaid to be formed of four peaks, in the cavity contained between which tradition places a lake or tank of very peculiar ſanctity; no one has ever ſeen this pool, for no one has ever attempted to aſcend theſe prodigious peaks. Beſides the phyſical difficulties, there is one to be encountered far more concluſive to the ſuperſtitious and blindly obedient *Hindu*. The goddeſs has eſpecially prohibited any mortal to paſs that ſpot appointed for her worſhip. A fuqeer, once in attempting to reach *Jumnotri* loſt his way, and continued aſcending the mountain till he reached the ſnow, when he heard a voice enquiring what he wanted; and upon his anſwering, a maſs of ſnow detached itſelf from the hill ſide, while the ſame voice deſired him to deſcend and worſhip where that reſted; that *Jumna* was not to be approached, or intruded on in her receſſes; that he ſhould publiſh this, and return no more under pain of death. I ſuſpect indeed that this prohibition is unneceſſary to prevent an af-

cent, to, or near the top of any of theſe ſnowy peaks. The extreme ſteepneſs, the rugged nature of the rock where it is bare, and the ſlippery ſmoothneſs of the ſnow, are, independent of the extreme heighth, and fatigue to be borne, ſufficient obſtacles.

THE exiſtence of ſuch a lake reſts therefore entirely on tradition and probably ſome obſcure legend from the *Sástras*; for it would appear that all this mountainous tract with its various cliffs and vallies, is frequently referred to as the ſcene of mythological ſtory, and to one of theſe tales, this mountain owes its name. *Benderpúch'h* ſignifies *monkey's* tail. It is ſaid that *Hanuman* after his conqueſt of *Lanca* (or *Ceylon*) when he had ſet that iſland on fire, by means of a quantity of combuſtible matter tied to his tail, being afraid of the flame reaching and conſuming himſelf, was about to dip this inflamed tail in the ſea to extinguiſh it; but the ſea remonſtrated with him on account of the probable conſequences to the numerous inhabitants of its waters; whereupon, *Hanuman* plunged it in this lake, which ever ſince has retained the name. — The zemindars aver, that every year, in the month *Phálgun* a ſingle *monkey* comes from the plains, by way of *Haridwar* and aſcends the higheſt peak of this mountain, where he remains one twelve month, and then returns only to give place to another; but he returns in very ſorry plight, being reduced nearly to a ſkeleton, with the loſs of all his hair and great portion of his ſkin.

LEAVING this ſtation we deſcended a wooded and flowery path, croſſing ſeveral ſmall nullahs, and paſſing the ſite of an old village, where there were ſome fine old walnut-trees; around this, there was ſome cultivation, very backward of wheat, and a grain called *Papera*; and we ſaw ſeveral very large flocks of ſheep, the wool of which, like that of all this part of the country, is extremely coarſe. We ſoon after

crossed the *Unta Gunga*, by an old and rotten but better constructed bridge than usual; the river roars in a cataract of considerable height a great way below with much noise. The village *Curfali* is close to this bridge; a short ascent led us to it. It is the highest village in this glen, and is situated on the bank of the *Unta Gunga*, 150 feet above its stream; and near the extremity of the plain before spoken of, as forming the point between the *Jumna* and *Unta Gunga*; this plain is of considerable extent, it may contain 200 acres, and is well cultivated; there were several villages upon it, but now, the remains of two, besides *Curfali*, only are visible. This last is large and tolerably neat, and probably populous; but at present it is full of the inhabitants of all the neighbouring villages, who have brought the images of their gods to bathe. The chief man of the village, with the pundits and brahmins of *Jumnotri*, attended by a great number of both sexes, came out to meet us. The pundit, a mean and dirty looking fellow, clad with the rest in coarse blankets, came forward, and insisted on marking my forehead with the sacred yellow, a ceremony which I submitted to with a good grace as to a high compliment, and which was eagerly sought for by the hindu attendants, who, as well as the *Seana* and most of the villagers, received the blessing after me, and we all proceeded to our quarters.

The annual ceremony of carrying the images of their gods to wash in the sacred stream of the *Jumna*, is, it appears, one of much solemnity among the inhabitants of the neighbourhood; and the concourse of people now assembled here has been busily engaged, in doing honour to it. They dance to the sound of strange music, and get drunk on a sort of vile spirit, brewed here from grain and particular roots, sometimes sharpened, as it is said, by pepper. The dance is most grotesque and savage; a multitude of men taking hands, sometimes in a circle and sometimes in line, beating time with their feet,

bend, with one accord, firſt nearly to the earth with their faces, then backwards, then ſideways, with much grimace and many contortions. Theſe, and their wild dreſſes of black and grey blankets, give a peculiar air of brutal ferocity to the aſſemblage.

THE men dance all day, and in the evening they are joined by the women, who mix indiſcriminately with them, and keep up the dancing and intoxication till late in the night.

THEY continue this frantic worſhip for many days; and in truth, it bears much ſimilitude to their general manners and habits—ſavage and inconſiſtent. At a place ſo ſacred, where there are ſo many brahmins, and which is the reſort of pious pilgrims, it might be expected, that a ſtrict attention to the forms of religion, a ſcrupulous obſervation of the privations and auſterities enjoined by it, would be particularly remarkable; here, however, much is met with, ſhocking even to thoſe hindus who are leaſt bigoted. All claſſes and caſts of people, brahmins not even excepted, eat every ſort of meat, ſave beef, and I believe fowls, and drink ſpirituous liquors even to exceſs. Fowls are in plenty in this and the neighbouring villages, and they were even offered to me as preſents by the zemindars, which could not have been the caſe, had they been held in abhorrence. I was alſo ſurpriſed at their indifference, as to what might have appeared, and certainly would, in the low country, be deemed pollution to their temples. They themſelves pointed out the outer-room of a temple or place of worſhip for the uſe of the kitchen; and ſaw with perfect compoſure a muſſulman ſervant, kill in it the fowls they had themſelves provided, and dreſs them for dinner. I know not if the place was in general uſe for worſhip, it was old and in bad repair; but even to a ruined temple, the hindu of the plains would probably pay more reſpect than ſuffer ſuch a uſe to be made of it. The dreſs of the people before alluded to is, in fact, the

ſame we have obſerved through the whole country, often leaving the lower parts of *Sirmor*; a jacket or dreſs of blanket, tying like the common hindu *angarka*, around the waiſt and open down the right breaſt, light in the body and on the arms, but with ſhort ſkirts all round, very ample, and gathered in folds like the Scotch phelibeg; around their waiſt they wear a *comarband*, either of woollen ſtuff, or of rope formed of goat's hair neatly plaited. They wear drawers or trowſers very looſe to the calf of the leg, but tighter, and falling in numerous creaſes, to the heal; a piece of blanket ſtuff, ſomewhat lighter than the reſt, is worn round the ſhoulders like the Scotch plaid, and is uſed to keep the body dry, or the head from the heat, as rain or ſun may require; on their head they wear a black cap of hair or wool fitted to the ſcull, and ending in a ſmall point. The wool from which they manufacture theſe cloaths, is of extreme coarſeneſs; very far inferior to that met within *Biſeher*, or any of the hill ſtates to the weſtward, which ſometimes was wove into blankets of conſiderable beauty and fineneſs; their colours are only two, a dark brown, and the common dirty grey; the former is affected chiefly by the men of ſuperior rank and means; not a rag of cotton cloth was ſeen; and the dreſs of the women in no wiſe differed from that of the men,* except that ſometimes their heads were covered with a handkerchief blue or checked, and they wore beads of glaſs or pewter in as great profuſion as they could obtain them; and *bangles* of the ſame metal of great ſize, round their arms and ancles.

The perſonal appearance of theſe people is much the ſame as that of the *Biſeheris* about *Rampúr* and *Serán*. They have ſtout well built figures are frequently very fair, though much ſun burnt; their eyes often blue, and their hair and beards curled, and of a light or

* They wore ſomething like a petticoat inſtead of the trowſers, which the men dreſſed in.

red colour. They seem admirably calculated to be formed into soldiers for a hilly region. Here and there traces may be detected of the *Tartar* features, the small eye, high cheekbones and meagre *muſtachios*, but they are not ſufficiently prevalent to give riſe to the idea of any conſiderable intercourſe or intermixture. The language is ſtill *Hinduſtani*, and though ſtill very bad, it is rather more intelligible than that generally heard in *Biſcher*.

On making enquiry reſpecting the diſtance from this place to *Jumnotri*, the nature of the road, and the poſſibility of paſſing the night there, we were informed, that it is ſix cos, of very bad and rough road in the river bed; but that there is another route conſiderably longer with a ſevere aſcent, which is ſometimes uſed, when the river is too high to paſs; but there is no place to paſs the night in. We however believed the difficulties as uſual exaggerated, and determined to carry the neceſſaries ſufficient to enable us to remain a night, as I was exceedingly anxious to attempt reaching at all events ſome elevated ſpot on the mountain, both to judge of its ſtructure, and to make obſervations from.

The morning was exceſſively cold; the heights were clear, but clouds hung all around on the lower regions. Leaving every muſſulman ſepoy, the whole of the hindus ſet out on this pious errand; and the *Jumnotri pandit*, with ſome other brahmins, led the way: we paſſed the backward and green corn land, and entered *Jumna's* bed; the ſtream here is not large, but very rapid; we croſs it on a ſtick, and the path here becomes dangerous and difficult, in fact there is no track; but we proceeded in the bed of the ſtream, croſſing and re-croſſing it as the lofty overhanging rocks on either ſide jutted into it and alternately oppoſed our progreſs.

By one of theſe we were at laſt compelled to mount, and ſcrambled up through a thickly tangled wood of foreſt trees, dwarf bamboos, and creepers, frequently beholden to the roots and branches for our footing, till we reached the point of a ſteep crag, on which is placed a ſmall temple, ſacred to BHAIRAMJI'. The place is ſaid to be half way from the village, and BHAIRAMJI' is underſtood to be the avant courier of *Jumna*, and it is his duty to announce thoſe who come to worſhip her. His temple merely conſiſts of a few looſe ſtones, and is not three feet high. There is no image; but it contains a number of pieces of iron, with one, two, or more ſharp points, ſome twiſted and ſome plain; a ſmall braſs canopy hung in the center; a ſmall lamp and bell of the ſame metal, which is rung during worſhip. Here the officiating brahmin ſaid a long prayer with ſome fervency, ringing the bell and offering flowers, (which where alſo preſented by the attendants) thus propitiating the deity towards the ſtrangers. The place is curiouſly choſen—very wild and gloomy.

THE deſcent to the river from hence is more dangerous than even the aſcent, leading in ſome places along the face of the rock, where the want of natural footing is remedied by laying ſticks along upon the roots of trees, or pins driven into the fiſſures of the ſtone. When we reached the river bed again, the laborioufneſs and difficulty of proceeding was greater than below; the water was more confined and the deſcent quicker; the current more ſtrong and the caſcades more frequent and greater in height; while, in conſtantly croſſing and re-croſſing the water, its cold (having juſt left the ice) was ſo intenſe, as nearly to benumb the joints. We ſoon reached the ſpot, pointed out from below as *Jumnotri*, but it was not the ſacred branch; here two ſtreams joined the *Jumna*, and the rocks are more open than below. From hence, though completely at the foot of this higher region of the mountain, the peaks of ſnow are ſeen towering above us, as ready to over-

whelm us; and in fact, the bed of the river is here ſtopt up by a prodigious maſs of ſnow, which has carried down with it a mighty ruin of rock and ſoil. From under this maſs of ſnow one ſtream flows; and just above, the *At'h-paiſa Gunga*, equal to the branch which retains the name of the *Jumna*, ruſhes down in a broken cataract from the ravines of ſnow. From hence turning to the left, and clambering over a rapidly aſcending ſucceſſion of rocks, in a ſhort way, we reach *Jumnotri*.

THE ſpot which obtains this name, is in fact a very ſhort diſtance from the place where the various ſmall ſtreams which are formed on the mountain brow, by the melting of many maſſes of ſnow, unite and fall into a baſon below; to this baſon however, there was no acceſs, for immediately above this ſpot the rocks again approach over the ſtream, though their height is leſs formidable than below, and bar further progreſs in the torrents bed; a maſs of ſnow, blocks up the further extremity of this paſs, and the river iſſues from under it: between the two rocky banks, the breaſt of the mountain appears and cloſes the view, of vivid green, and furrowed by time into numberleſs ravines, down which are ſeen trickling the various ſources of this branch of the *Jumna*.

AT the place where it is cuſtomary to perfom ablution, the rock on the N. E. ſide of the river is very ſteep, and ſeems of the ſame nature as that which has been noticed at *Aſari Gerh*, apparently quarizoſe, and chiefly white, but exhibiting a variety of ſhades and colours. The ſtructure like that too is *laminar*, and from between the *lamina* run ſeveral ſtreams of warm water. There are ſeveral other ſources: and one particularly, whence ſprings a column of a very conſiderable ſize, ſituated in the bed of the river between two large ſtones, and over it, falls a ſtream of the river water.

This water is much hotter than that before taken notice of at *Asari Gerh*, as well as in greater quantity; the hand cannot be borne in it for a moment, and it emits a very considerable quantity of vapour. I could not detect the least acidity to the taste, nor any sulphureous, or other smell: it was perfectly pure, transparent and tasteless. A great quantity of a red crust, which seemed to consist of an oxid of iron, with some gritty earth, covered all the stones around and under the stream, and was to all appearance deposited by the water. This by exposure to the air, hardened into a perfect, but very porous stone; whilst below the water it was frequently mixed with a slimy substance of a very peculiar character; very tenacious; of a dull light yellow colour, some what like Isinglass: it was certainly as well as the above described crust, produced from the water, for it covered the stones, over which the stream ran, and was very abundant. These warm springs are of great sanctity, and the spot for bathing is at the point before mentioned, where the cold and warm water mingle and form a pool about milk warm. The springs have all particular names such as *Gauri Cund*, *Terbet Cund*, &c. and as usual some, superstitious tale is related of their origin. It is said, that the spirits of the 12 *Rishis*, or holy men who followed *Maha Deo* from *Lanca*, after the usurpation of the tyrant RAVAN, to the *Himala* range, inhabit this rock, and continually worship that Divinity; why this should produce warm water, is not quite so clear. Here however, all the people bathed while the brahmin said prayers and received his dues.

ALMOST every sort of stone and rock, which we have seen in our course through the hills, is observed in the bed, and on the banks of the upper part of the *Jumna*. Of these, two predominated, that first met with in the course of the *Paber*, in large rounded masses, was particularly plentiful, consisting or composed of much mica, quartz, and

coarſe ſand or grit with abundance of a hard black ſubſtance, probably hornblende. The maſs is of various, but generally great hardneſs, and I believe, it is a ſpecies of true * granite.

THE other next abundant, was that white laminated rock, from which the hot-water trickles, and which has been called quartz; it is met with of yellow, red and greeniſh tinges, but always in lamina. *Shiſtus* or ſlate, of every ſort, micaceous, and coloured of every tint, and of all degrees of hardneſs; grey, red, whiteiſh and blueiſh, is alſo abundant, and always plentifully veined with quartz. This ſtone, is by far the moſt common and plentifull all over theſe hills. There was no lime-ſtone, evident, unleſs ſome ſpecimens of the white laminated rock reſembling marble, be of a calcareous nature, which is not improbable; but I had not an acid of any ſort as a teſt, and have to regret my incompetency to ſpeak with any degree of poſitive certainty on mineralogical ſubjects.

DURING the courſe of our tour, it was peculiarly obſervable, that the rocky and more abrupt faces of the loftieſt hills, in the whole extent from the plains to the ſnowy range, pointed in a north weſterly direction, but varying very much, according to ſituation and circumſtances; and that the oppoſite faces, though always rough and unequal, were more ſloping and leſs precipitous; THIS diſpoſition was more conſpicuous and diſtinct, the further we entered the hills and the nearer we approached the high rocky peaks of the ſnowy range.

IT was alſo obvious that the ſtructure of theſe rocks was ſtratified; ſometimes conſiſting of different kinds of ſtone, at others apparently of the ſame ſort exhibiting merely this tendency in the formation and fracture. Theſe ſtrata were always at an angle with the horizon; dif-

* I think that ſome part of this rock was believed to be *Sienite*.

ſering materially in its elevation, but generally about 45 degrees; and moſt frequently pointing in a line from north eaſt, to ſouth weſt. This formation was peculiarly evident in the rocks forming the banks of this part of the *Jumna*.

It would be pleaſing to ſpeak of the vegetable productions of this remote ſpot, but here I am equally unable as in geological enquiries, to ſatisfy ſcientific curioſity. Thoſe trees and ſhrubs which are met with through the whole range of this hilly tract, are alſo ſeen here, and there are ſeveral additions, which could they be botanically deſcribed, might be intereſting. Of pines, thoſe which reſemble the ſilver and ſpruce fir, as well as one perfectly reſembling the Weymouth pine with two ſorts of *Larch*, are found; the birch, and a ſpecies of the ſycamore, oak of ſeveral ſorts, with a great profuſion of trees and plants cover the rocks and hills, to the extent of the woody region; the ſtrawberry, both the common *ſcarlet*, and the *alpine* ſorts, and fine and large of their kinds, with raſpberry and blackberry buſhes, were very abundant; and here for the firſt time I recognized the black currant buſh. The round leafed rhubarb we alſo ſaw, but I could not find, that the natives uſed it medecinally. The *Gork'has* uſed their roots as a poultice, to apply to bruiſes and hurts. The pundit preſented me with an herb of peculiar and very pleaſant ſmell which he pulled from off the bare rocks, at the higheſt part of one day's journey, it was called *Máhi*, and is conſidered ſacred; it was very ſmall, not growing above 2 to 3 inches in heighth, with a ſmall bunch of leaves reſembling fennel.

Our return down the bed of the river was rendered fully more difficult and dangerous, by an increaſe which had taken place in the ſize of the ſtream, ſince we aſcended.

SUDDEN fluctuations of the size of the river are very common without any immediately apparent cauſes; and they are to be looked for in the changes of the atmoſphere, which take place very rapidly in theſe hills, and have a ſpeedy effect on the ſnow, and conſequently on the many ſources of the river; partial falls of rain too occaſion a quick, but momentary riſe. Even when low, the dangers of the path are conſiderable, and I am confident, that by this road, it would be impoſſible to reach the place, was the river at all higher than we found it. Though trifling in detail, the obſtacles are numerous and ſerious in practice, and it is the firſt day's march we have made, where I thought the danger and difficulty conſiderable.

WHEN we arrived at the village, enquiry was made reſpecting the route to *Gungotrí*, and it appeared their were two ways. The one would carry us back 3 day's march on the road we came, and croſſing the country between the *Jumna* and *Ganges*, where it is narrow, would take us to *Barahát* on the banks of the *Bhágirat'hí*; this would occupy 4 days, and *Gungotrí* is called 8 more from them, but the road is very eaſy, and proviſions and neceſſaries p'enty.

THE other road it is ſaid goes over a high country, through ſnow; it was firſt called four days, but now allowed to be only 3 day's journey from hence to the next inhabited ſpot; the whole way deſert and dreary, but perfectly practicable. But both GOVIND BHISHT, the *Seana* of the village, and all the zemindars who knew the path earneſtly diſuaded me from making the attempt. They ſay, that during the chief part of two day's march, in croſſing a high ſnowy hill; they meet a poiſon in the air, which ſo affects the travellers, particularly thoſe who carry loads; that they become ſenſeleſs, lay down, and are incapable of motion. They cannot account for this phœnomenon; but it is

it to proceed from the powerful perfume of myriads of flowers which cover the ſmall valleys on the hill ſides; but they themſelves are not apparently ſatisfied with this explanation of the difficulty.

On reflecting on every circumſtance which had paſſed, and weighing theſe now laid before me, I determined to attempt this dangerous route.

July 16th.—We left *Curſali* at 6 o'clock, and croſſing the *U'nta Gangá* a few furlongs, above the bridge began our aſcent which leads us through various jungle to *Súnapalí-ci-Dhar*, whence a noble view would be obtained, but for the uſual circumſtance of miſt overſpreading the country around; birch-wood was very plentiful on this aſcent, little differing from the common birch of Europe; the leaf is larger, though of the ſame ſhape, and it is not ſo fragrant as the beautiful ornament of the Scotch-woods.

From hence we continued our aſcent up a ſteep hill face covered with ſhort graſs, ſmall mountain flowers and ſtunted buſhes, which gave it a ſtrong ſimilarity to many of the brown hills of Scotland. And here indeed I firſt diſcovered their own characteriſtic plant, the true *heath*, or *heather*; it is not exactly the ſame ſpecies as that, moſt common in the highlands; its ſmall leaves cover the ſtem in four regular rows upwards, ſo as to give it a ſquare appearance; its bell is delicate and white; and at ſome diſtance it is very ſimilar, ſave that it has not that blooming purple glow, that gives the mountains their rich colours. I have ſeen it however growing among the other ſpecies, though not abundant. Here too that beautiful bird, the Peacock-* pheaſant was ſeen and heard in greater numbers, the higher we roſe, and might have been taken for *Grouſe* in their own *Heather*.

* The bird is called indiſcriminately *Retnál* or *Morál* by the natives, and is one of very uncommon beauty. The cock bird has a body of dark gloſſy blue; the neck and breaſt ſhining with purple and gold, like that of a peacock. On the head he carries a creſt of ſeveral feathers, which forms a ſhining plume;

THE aſcent from *Súnapali*, to *Dig Dhar* is ſteep and irregular, leading over many high peaks, and continues along the brink of a very deep precipice, the bottom of which was however not in view, from the thick fog that filled the vallies and enveloped the heighths; our path is good but tireſome, from dipping and aſcending frequently. *Bender-puch'h* lies on our left hand.

when flying, his back uncovered by the wings, ſhews white; and he ſpreads a tail of reddiſh brown feathers. His note is a peculiar and very mellow whiſtle; he frequents the higheſt, coldeſt, and leaſt acceſſible peaks; and it appears that the higher we aſcend, and the nearer we approach the ſnow, the more frequently they are met with, the more numerous they are. In to-day's march, we have found more than on any preceding one; but they cannot be conſidered as at all abundant. The hen bird is of a ſpeckled brown colour, a little larger than the *Heath'hen*, (the female of the black or wood grouſe,) and has much of her appearance. Their fleſh, particularly that of the young ones, is very delicate, and has much of the game flavour.

No game, of any ſort, is found in plenty in theſe remote hills; nor in fact, are any ſpecies of animal in a wild ſtate ſeen in any abundance; but there are ſeveral ſorts of deer now and then met with, and of theſe perhaps the *muſk deer* is the moſt remarkable. They are ſcarcer even than other kinds, becauſe the valuable drug they afford, renders them an object of more eager requeſt.

The muſk, it is well known, is contained in a liquid ſtate in a bag, at or near the navel of the animal, and is taken from it juſt as it is found, with that part of the ſkin attached in which the bag is formed. A ſmall hollow ſtick is introduced, communicating air to the muſk, till it dries, and the whole is tied round with a ſinew of the animal. In this ſtate the whole (called a "muſk naſa or muſk pod") is ſold; ſkin, ſinew and all, for about twice its weight in ſilver, and is very highly prized in the country. It is ſaid, that the bag containing the muſk, muſt be extracted from the animal, while yet alive; as, if he dies, or is killed, it diſſipates, or is re-abſorbed into his body, therefore he is never ſhot, but ſnared alive, and it is common, when it is known, that a muſk deer is on a neighbouring hill, to turn out the country to haunt him down. From the great value of this commodity, it is natural to ſuppoſe that it is frequently adulterated, and accordingly this is done by injecting a portion of the animals blood into the bag, while the muſk is yet liquid. Thus in purchaſing this drug, much caution is requiſite. It has been ſaid, that the quantity produced of this drug is ſmall; the muſk pods are commonly ſent to the chief or raja, either as preſents or at a certain rate, in lieu of ſo much tribute. A ſmall part is bought by the low country merchants, who find their way to the hills, and who receive muſk, opium, iron, &c. &c. in return for the cloth, ſugar, &c. which they bring; but, on the whole, there can be no great annual ſupply; and if the hills to the ſouth eaſtward produce the animal in no greater abundance than thoſe that lie between the Alacananda and Setlej, the market can never be ſupplied, far leſs glutted, with genuine muſk.

Another ſort of deer is called by the natives the *garr'l*, and this is the only ſort that has fallen under our own obſervation. It is dark brown and of the ſize of a roebuck, and has horns reſembling that animal's, from 6 inches to a foot in length, ſharp at their points, and rough at the lower extremities; it is extremely active, and was only ſeen upon impracticible precipices.

Of other animals we only ſaw the horns, and were informed of their exiſtence upon enquiry, to which we were led by ſeeing theſe horns in large numbers hung up in, and about their temples. This is a univerſal cuſtom, and every ſpecies of animal that carries ſuch weapons contributes to thus ornamenting theſe holy pla-

REACHING a point called *Gúrmú-cá-G'hát*, we descend into *Cúrmí-cí-Gád'h* which has its rise by two sources in *Mála-cí-Tiba*, and joins the *Bhím-cí-Gád'h* about one mile below, to the right. A weary ascent and unpleasant path along the hill face, carried us to a point just above *Bhím-cí Gád'h*, into the bed of which we descended; along a hill face, covered with fern, the lower part of which was scantily cloathed with shaggy birch; from the time we left *Súnapalí-cí-Dhár*, we were beyond the region where wood can grow, and it is only in the lower-parts of the valley, just on the nullah's banks, that we again discovered it re-appearing in this thin stunted birch; we have passed much snow in the clefts and hollows, though the road has not actually led over it.

THE *Bhím-cí-Gád'h* here, is larger than the *Jumná* at *Cursalí*, but it has every appearance of having been temporarily swelled by a fall of rain which has been heavy to-day in the mountains; it is very muddy, and extremely rapid.

ALL the hills here seem abrupt to the south, and point their strata in directions between S. W. 20, and S. E. 20; inclined to the plane of

ces; even rams horns have their place. One sort we observed were very remarkable; when of a middling size, they are at least 3 feet long, they grow near each other at their base, and fall backwards with a bold semicircular curve and diverging from each other gradually; on the upper curved side there are articulations, from 2 to 3 inches distant from each other, the whole way from the base to the top.

The natives say, that these horns are the produce of an animal partaking of the appearance both of the deer and the goat, but more particularly resembling the latter; that it is large, as may be inferred from his horns, and that it is only found in the most remote, inaccessible, and coldest parts of the hills; that in the depth of winter, when the very villies are covered with snow, which indeed remains on them for 5 or 6 months, this animal comes down almost to the very villages, with herds of other species; it returns as the snow melts, to its fastnesses, and about this season is seldom seen. The natives call it * *Burrl*; its skin is furnished curiously with a thick soft cradick hair, and forms a comfortable bed to lie on. They are accustomed to place its horns not only in temples, but on the graves of such as were in their lives esteemed holy; and appear to attach to them some mysterious charm. We found one pair on our route, which had been placed at the spot where a man had perished in the snow; they were quite destroyed by the effect of weather.

* *Baral*, see MOORCROFT's tour. *A. R. Vol.* 12th.; there can be little doubt, but it is the *Argali* of *ovis ammon*.—*Secretary*.

the horizon at an angle nearly ſimilar to that before obſerved (45 degrees;) ſuch are the hills forming the north ſide of the glen; thoſe on the ſouth ſide, preſenting their northern ſides to us, are more rounded and ſmoother than ordinary, covered with green and brown, as if there was much heather; much ſnow upon them towards their tops, and large ſcaurs of black and white rocks, ſtreak their breaſts, where the ſnow or the rain has bared them of ſoil; the very ſkirts are fringed ſcantily with ſtunted wood, whence run green ſlopes covered with fern and a beautiful ſort of thiſtle, through which burſt a profuſion of flowers of every hue, and in a deep ſtoney bed, winding through this green valley, runs the *Bhîm-ci-Gâd'h*.

We continued along the ſtream for ſome time, and paſſed a ſpot, where for ſeveral furlongs the water runs under a large maſs of ſnow that fills up the bed entirely. Beyond this, the valley opens out conſiderably, diſplaying a pretty wide extent of rich verdure, though ſnow is all around; indeed for nine months of the year, the bottom of the valley itſelf is covered with it. Thus no cultivation can be attempted; but the vegetation is rapid and luxuriant, affording paſture to large flocks of ſheep which are driven here at this ſeaſon.

We ſoon came to our encamping ground, which is near the top of the glen, a little way from the bridge of ſnow. A cave, under a large ſtone called *Bhîm-cá-Udâr*, ſerved as a covering; under this and a few ſimilar rocks, our party to the number of 60 or more, contrived to accommodate themſelves.

We have reached the top of the valley of *Bhîm-ci-Gâd'h*, and are in the heart of the ſnow; the hills which form the valley, are continuous with the range of ſnowy peaks, that quite cloſe to us in front, bound

our view. A rocky ridge divides the large ſemicircle before us into two parts; in the back ground of that on the left hand, the eaſtern peak of *Bender-puch'h* riſes to a prodigious heighth; while from its boſom ſtretches down a large hollow of deep ſnow, cut into ravines, and precipices of a fearful heighth. The mountain itſelf exhibits one huge ſnowy maſs, without ſpeck or ſtain.

On the right, *Sumèru Parbat*, a peak hardly inferior to *Bender-puch'h*, forms the center of a ſnowy hollow, as rugged and deep as that to the left; from each of theſe, ſtreams ariſe, which unite, and form *Ehimci-Gád'h* at a very ſhort diſtance from hence. As we were but a very ſhort way from theſe hollows of ſnow, we obtained a better idea than we had any opportunity to do before, of the vaſt thickneſs to which it has accumulated.

The hill people aſſured me, that it muſt be 500 cubits, while I was looſely ſuppoſing to one of them, that the face of one of the precipices of ſnow was 300 feet; this ſhews the opinion the natives entertain, but indeed only the wildeſt conjecture can be offered, for what mortal can ever reach them; they are deſolate, cheerleſs, and unapproachable.

The journey of to-day, is the firſt which has been totally deſert; not a houſe, nor a hut, nor any veſtige of cultivation, nor trace of man, has any where appeared; it has been deſolate throughout; but the hills have been particularly verdant, and the paſture very rich; not only a variety of graſſes covered the ground, but a profuſion of the loveliеſt flowers burſting through this green carpet gave the livelieſt effect to every ſlope and bank; the beauty of the thiſtles and ferns, was particularly conſpicuous, and cowſlips, polyanthuſes, orchiſes and

lillies of every colour and ſpecies were in great profuſion. Among other ſhrubs, to-day we remarked the common juniper, eaſily recognized by its berries and ſmell.

July 17.—This morning was cold and foggy; by a little after day light, we were in motion, and continuing our courſe to the very top of the glen, croſſed *Cúnál-ci-Gád'h*, juſt as it leaves the boſom of ſnow below *Benderpuch'h*, upon a bridge of ice; hence croſſing the point formed by the junction of the two water courſes, we paſſed many of the ſmall ſtreams that form this eaſternmoſt branch of the *Bhém ci-Gád'h*, and commenced a very difficult aſcent along the principal one which falls here from a large maſs of ſnow and continues to run under it; this was an exceedingly painful part of our road, as the aſcent was very ſteep and ſlippery. The ground was here bare and the graſs ſtunted, yet there were ſtill plenty of flowers; a little further on, vegetation decreaſes ſtill more; hardly any thing being ſeen, where the ground is bare of ſnow, ſave a ſcanty green ſlime and brown moſs, like that found on barren damp grounds. A baſon or hollow was here formed in the mountain of ſnow, and the ruins of the peaks around, heaped on each other. It was exceedingly cold, and a moderate warmth even, was only preſerved by the toilſome exerciſe of climbing theſe heights. Many of the cooleys, and ſeveral of the ſepoys, both *Gork'ha* and *Mewati* now began to lag, and were hardly able to proceed, and every one complained of the poiſon'd wind. I now began to ſuſpect that this ſuppoſed poiſon was nothing more than the effect, which the rarefied ſtate of the air, from the great heighth we have reached, has on the lungs, and this ſuppoſition I was led to frame from my own ſenſations; I could hardly command ſtrength enough to climb the ſteep rocky path, and experienced in breathing much difficulty and oppreſſion, as if there were an inſufficiency of air. I do not think we could long have borne it, had

the aſcent continued much further. In this baſon we paſſed a ſmall pool of water, held very ſacred; it's name is *Mátri-cí-Tál*, and from it the chief ſtream of *Bhím-cí-Gád'h* iſſues: it is filled with ice and ſurrounded with ſnow.

FROM hence we paſſed over another hollow and ſteep aſcent of ſnow, which lies deep on maſſes of bare rock, and reached the top of the ridge called *Banſúrú-cá-Chít*. The cold was very great, and it was painful to remain any time in inaction, yet every one was indiſpoſed to move, and a tendency to ſleep was very perceptible. The moment that any one who complained much of the oppreſſion at breaſt lay down, he inſtantly dropt aſleep, and was with difficulty rouſed. Eating a few mouth-fulls gave a ſlight relief, but nothing materially alleviated it, nor was any one free from the general ſymptoms of debility.

IF the line can be drawn with any degree of exactneſs, the bottom of this aſcent appears the extreme heighth to which vegetation extends. At the top, there is not even the dull moſs or lichen ſeen below; the ſtones are bare and unchanged, except by the air; and no ſign of life appears, except a few *retnáls*, and theſe flew together in coveys.

THIS being probably the higheſt point to which we were likely to aſcend, I took particular notice of the rocks which compoſed the mountains: fragments of which chiefly formed the ridge we ſtood upon. They were principally the ſame as thoſe remarked in the bed of the *Jumna*.

THAT hard ſtone, formed of white and black materials, and firſt met with in the *Paber's* bed was moſt abundant; micaceous ſchiſt much veined with quartz; and a ſort of moderately hard blueiſh ſtone, much

pervaded with shining particles, and common in all rivulets at home, with several less remarkable sorts, lay in varying quantities all around. I think also I saw that common sort called whin stone, but in no great quantity. During the short opportunities afforded me by partial openings in the fog, I took particular note of the nearest and highest cliffs in view; and as far as the glass could determine or be trusted, they consist of the same kinds of rock as those found in the route we have gone over to-day, and just now described; the colour, the shape and fracture, is similar: white, red, reddish yellow, black and blue, at times in strata, at times in shapeless masses; but the primary formation of the hills is always stratified; the angle of elevation, and the direction of these strata, is ever the same.

THE ridge in which is *Banfúrá Ghát*, is continuous with *Banfúrá-cí-Dhár*, which sweeps down to the southward in several peaks from *Sumeru Parbat*, and is thus connected with *Bender-puch'h*; beyond the *ghat* to the southward, it rises into several high peaks, and is lost in *Bacrí-cí-Dhár*, *Panda Rassu*, *&c.* The western side is that which we ascended, the eastern looks into a similar bason to that we have passed, from the snow of which *Banfúrú-cí-Gád'h* flows to the *Bhágirat'hi*; it is singular that on the eastern side there is more soil, though not more vegetation than on the west, in spite of the action of the snow, which it might be presumed annually wearing the mountain away, would leave little on its side but bare rock.

FROM this *ghát* the road wound along the mountain brow; with many deep indenting and irregularities, but with little general descent, if any, and was accordingly laborious, passing over much snow, and moist slippery rock, till we reached a pass called *Ch'háyá-cá Cánta*.

Ch'háyá-cá-Cánta is the point at which the true descent commences, and I believe is little inferior in height to *Banfúrá cá-Ghát*; it is

ſaid that in clear weather, the plains of *Hinduſtan* may be ſeen from hence; but a thick fog, with heavy rain enveloped us at this time, and completely baffled the hopes I had of gaining any uſeful bearings.

A VERY ſteep rapid and difficult deſcent begins here and carried us to the ſource of *Chinpo-gád'h*; which is here formed from a number of ſources, from the melting ſnow. We followed the courſe of this ſtream, rapidly deſcending for a very long way, till it is joined by another and far larger one, called *Rindi-gád'h*, which has its riſe in a prodigious ſnowy hill named *Dúdian-ci-Bamec*, to the north weſt: it is very rapid and impaſſible. The ſpot where theſe ſtreams meet is called *Lama T'halan*, and is very lovely.

PURSUING our courſe along the united ſtream, now known by the name of *Rindí Gád'h*, we croſſed it upon a very large maſs of ice, which filled up the bed for a long diſtance; and a mile further, on reached a ſpot, thick in foreſt, which is marked by ſome very noble fir and ſycamore trees, under the ſhade of which our guides propoſed that we ſhould paſs the night; and thus, the formidable journey which they earneſtly diſſuaded us from, and which was reckoned by GOVIND BHISHT at 40 cos, proves to conſiſt of not more than 27 * miles, or 18 cos; a diſtance we could eaſily have traverſed in two days, but for the following reaſons. That but few ſituations are found where the requiſites for ſhelter and fire, may be met with, ſo as to be fit for a halting place. *Bhim-ci-Udár* being almoſt the only one; and even there fuel is only procurable at

* Of the wheel; one day's journey..... 10½ miles.
one ditto..... 11¼ ditto.
Hence to the village *Súc'bh*..... 5 ditto.
26¼

a conſiderable diſtance; and, tha· the ſteepeſt and moſt painful aſcent commences near *Bhim ci Udár*; between which aſcent, and the place we have now reached, there is no ſpot where reſt, ſhelter and firewood for a night could be obtained. Thus travellers muſt remain the firſt night at *Bhim ci-Udár*, as the two day's journies are far too laborious to be performed in one; and the ſeverity of the ſecond, fully makes up for the eaſe and ſhortneſs of the firſt, both by the ſteepneſs and difficulty of the country, and the badneſs of the road, but above all by the artificial fatigue brought on by the oppreſſion of breaſt which we all felt ſo much.

THE vegetable productions of to-day's march, though much of it was quite bare of vegetation, were very various; two flowers particularly attracted attention; one was called the *Gugul* and grew ſomewhat like the common flat thiſtle, with leaves radiating from a center, like the repreſentation of a ſun; in the center, was a flower level with the flat leaves, much reſembling the bloſſom of a pine apple plant. This flower is held in high religious veneration. The other conſiſted of a ſtalk covered with large and long leaves, ſomewhat like thoſe of a primroſe; ending in a cup reſembling that of a tulip, but which was formed merely by a continuation of leaves of the ſame ſort; which cloſed round the ſtamina and piſtil, forming the petals of a very noble flower. Theſe at their inſertion were greeniſh, like the ſtalk and lower leaves; but their upper parts are black and yellow, and the center of the cup is of the ſame color, but far more vivid. The hill people called it **Birmah Cáunla*, becauſe, as the guide informed us, "it was as the raja among flowers." We could obtain no explanation of the terms, and therefore the application of the name is not intelligible.

* The divine water lilly or Camala.

No living thing was ſeen on this march ſave the *monál*, which flocked together in packs, and appeared of a ſpecies ſomewhat different from thoſe in a lower region.

July 18.—The morning was miſty; the gorge of *Ch'háyá Canta* was however diſtinguiſhable at a prodigious heighth above us. That paſs, we are informed, was the ſcene of a great battle between the rebellious zemindars of the remote parts of *Rewaen*, and the troops of the raja; which, to the amount of 2000, were ſent to collect the revenue, and puniſh the notorious and daily robberies which were there committed. The zemindars upon this *foreign* interference, joined and encountered the weary and ſtarved troops, and killed the greateſt part of them.

LEAVING our pleaſant grove, we deſcended quite into the nullah's bed, and by a rough intricate path through thick jungle, we reached the *Súní Gád'h*, a rapid torrent of the ſame ſize as the *Rindí Gád'h*, and croſſed it by a wooden bridge, whence a ſteep aſcent led us to *Candí-cá-Ghat* in *Candí-ci-Dhár*. This probably ends the detail of ridges which are thrown off by *Bender-puch'h*, and its dependent hill's, and which we have croſſed on our route during theſe two laſt marches. The ravines dividing theſe, all ſend their waters to the *Bhágirath'í*, and chiefly between the villages *Súc'hi* and *Guſſalee*; but many inferior ranges riſe, which ſtretch to the ſouthward as far as the plains, and ſwell that river with the ſtreams they give birth to.

FROM this heighth we firſt obtained a momentary glimpſe of the *Bhágirat'hí*, running far below in a narrow rocky bed, and the enormouſly lofty and ſharp peak of *Srí Canta*, diſtinguiſhed between clouds, gave a noble earneſt of what the view would have been if weather had at all favoured us, but miſt again enveloped us and diſ-

appointed our hopes. We left our lofty ſtation, and by a rough ſteep deſcent reached the village of *Suc'hi*,* which is ſituated near the foot of a hollow that runs down from *Canda-ci-Dhár*, and nearly a mile from the *Bhágirat'hí*; we have paſſed through ſome ſtraggling cultivation, but the country has much the air of neglect and depopulation. Some fine old walnut trees, and many apricot and other fruit trees, ſhew that the village once was large and thriving.

THE river from hence appears nearly as large as the *Set'ej*, when we firſt ſaw it at *Ranipúr*; but its banks are far wilder than any thing we have yet ſeen. The chaſm in which it rol's is on a much larger ſcale, and the ſavage roughneſs of its mountainous precipices keeps pace with their increaſe in ſize. Bare rock is much more predominant, and wood, every where thinly ſcattered, ſtill more ſparingly ſprinkles the rocky pinnacles, which form but one precipice from their peak to their baſe; ſuch is the appearance of the river bed viewed downwards from *Suc'hi*, in a line, but little to the weſt of ſouth, till ſhut in by cloſing mountains.

LEAVING the village, we croſſed the end of a ridge a little above it, and deſcended to the river ſide, at the lower part of an opening in its bed, of a ſingular nature; it meanders for more than two miles in a flat ſhringly ſpace, which may vary in breadth from one to ſix furlongs broad. Juſt above this ſpace, on the weſt or right bank of the river, three villages are ſituated on a ſlope, ſomewhat leſs inclined than the ſurrounding hills, and on which there are many fields of wheat, &c. Precipices deſcend on the oppoſite ſide quite down to the river; at the lower end of this ſhingly ſpace, there is a ſlight wooden bridge under which the river now again contracted, runs with great violence. Croſſing this, one road lay along the bottom of the precipice, where

* See this village in the outline of Lieutenant Webb's Survey.—Aſiatic Reſearches, vol. xi.

there are many bad ſteps; two miles from the bridge, on the oppoſite ſide, the *Shear Gad'h* enters the river, which riſes in a lofty wild range to the north of *Benderpuch'h*, called *D'hum D'hár*, along which there is a very dangerous path leading to the remoter parts of *Rowaen*. The hill itſelf ſeems to be an object of ſuperſtitious fear to the hill people.

THE courſe now was nearly eaſt, and the road became very difficult. Two large ſtreams join the river a little way on; the *Gúmti*, and the *Hersila Gangá*. The firſt bears a large body of water along a moſt craggy and tremendous cleft in the right bank, and, we are told, takes its riſe on the ſouth-eaſt ſide of a ſnowy hill called *Neázl*, forming part of the boundary between *Rewaen* and *Biſeher*, and probably runs in a direction from ſouth-weſt to north-eaſt, or from weſt to eaſt, to the north of *Benderpuch'h* and its range; it is ſaid to be eight day's journey hence to the north-weſt, the road through ſnow, and very arduous and dangerous. The *Biſeher* men who come to *Gangotrí* and the neighbourhood, either from religious motives, or to ſteal ſheep, make uſe of this road when the ſeaſon admits of it.

THE *Hersila Gangá*, juſt above the other, is of leſs ſize, the chaſm it runs in, as wild: it has its riſe in the *Qureiro* range, and between it and the *Gúmti*, there is only a narrow ſlip of ſharp rock near their *debouche*; the gap in the river bank, that admits theſe two rivers, is very remarkable for its ſharp craggyneſs.

JUST beyond, on the eaſtern bank, are the ruins of a village named *Cuchaura*, where once a *Rana* lived who held ſway over all *Tazmaur*; but ſome ſmall trouble with the *Bhótias*, who live under the *Chineſe* dominion, at a great diſtance from hence, and theſe people came and deſtroyed the village, depoſed the *Rana*, and demoliſhed a temple, which was in conſiderable repute, to the God *Rais*. The *pandit* of

Gangotri, who was the relater, cannot say when this took place, but as it is traditional, and this species of information does not appear of long endurance among this people, it may probably not refer to a very distant period. The ruins of the *mat'h* or temple, are still to be seen. The village *Durâli*, our stage for the night, was but a short distance onwards, and we reached it easily by 5 o'clock.

This village, the highest in the bed of the *Bhágirat'hí*, is situated just above the confluence of the *Keri Nullah* with the river, and is stated to be 12 *cos* from *Gangotri*: it formerly was populous, and comparatively rich; the revenue it produced being 75 rupees annually, of which 22 were appropriated to the holy purpose of supporting the religious establishment of *Gangotri*. In the time of the *Gorc'ha* power, 45 were thus bestowed; but, by the *pandit's* account, who related these particulars, little or nothing now arose from this source. Just opposite, on the other side of the river, is situated the village of *Mukabba*, once populous, and of its revenue (also about 75 rupees) half went to the establishment of *Gangotri*, and half to the catching and training of hawks for the *raja's* amusement. Now, the *pandit* and his family alone, consisting of about 15 persons, remain of its whole population. The village of *Cachaura* also, till lately, produced a revenue to the crown of 75 rupees, but now it is quite desolate; and this total desertion or partial deterioration, is universal in the country. A village called *Suparga*, which formerly existed at some distance below, was presented, it is said, by *Raja* MÁN SINH when he came to bathe at the sacred spot, to the *Gangotri* establishment. Now the *zemindars* have totally deserted it, and only the name remains. There can be but little doubt, that this desolation in cultivation, inhabitants and general prosperity, may be referred to the iron rule of the *Gorc'ha* conquerors.

When we reached the village, no male inhabitants were to be seen, save a few old *brahmins* and decrepid old men, who, with the women and children, remained in the houses. In answer to our enquiry, as to where the others were—we were readily and unhesitatingly answered, "that they had gone to buy corn, or to steal sheep;" and in a tone, that proved they thought this a piece of business, too ordinary and common to conceal.

From the descriptions attempted of the nature and appearance of the *Jumna's* banks, it may be conceived, that nothing wilder or more impracticable could well present itself to the traveller, than the scenes they afford; and I confess, that while viewing them, this was my own idea. Nevertheless, it is certain, that the character of the mountains which form that part of the *Bhágirat'hi's* banks, we have passed today, differs from that of any yet seen, and is marked by features still more rugged and inaccessible.

The common dress is here the same as that in use at *Cursáli*—blankets of black or grey wool.

Just at the entrance of the village, I was struck by the sight of a gooseberry bush, a plant we had long looked for, without success; it was growing in a neglected state, but there was fruit upon it nearly ripe, though small and sour, and there could be no doubt of the identity of the plant; this nearly completes the list of the common English garden fruits, found in the hills.*

* Here, when settled for the night, enquiries were made respecting the roads, which lead from this point to *Badarináth* on the one hand by *Gúlár*—and to *Barussú*, near the head of the *Tonse*, on the other; both across the snowy hills; as well as respecting what Passes there might be in this neighbourhood through them to the *Chinese* dominions, the boundaries of which, I learnt, commenced at no great distance: and having understood that two *Bhoteas*, inhabitants of a village within the *Chinese* territories, were in the neighbourhood, I desired they might be brought for the purpose of questioning them.

July 19*th*.—A misty morning succeeded a night of drizzling rain, and we set off for *Gangotri* about 7 o'clock; the distance we were told

There are in truth no roads from hence, save that by which we came, that lead through any practicable, or indeed to any habitable country in the first instance. But there are, as has been before remarked, paths which are used by travellers for shortness, or by thieves on their excursions to plunder neighbouring districts of their sheep and cattle, during a few of the summer months, when the snow has lessened: and thus frequently a prodigious round is cut off from a journey, where the usual long road is taken. For, in these hills, places that are in fact very close to each other, are moved to a ten or twelve day's journey, by the imperious nature of the country, and this is well exemplified in the relative positions of *Gangotri*, *Cédárnáth*, and *Badarinath*, which all lie in one ridge of hills: and of which, the first and second are not, in truth, 12 to 15 horizontal miles distant, while the second and last are still more near. Yet taking even the shortest route, and going the longest marches, ten or twelve days are requisite to travel from *Gangotri* to *Cédárnáth*, because a very long round is taken to avoid mountains totally impracticable. Of this road, I could gain no distinct information; as no one here had ever attempted it, but it is described as worse than that from *Jumnotri* to *Suchi*, and extending to fully eight days, during which no habitation or trace of man is seen, and snow is chiefly predominant. There is neither shelter nor wood.

The lower road by *Cachaur* is even more tedious, and is in fact equivalent to going down the one river, and up the other, for it passes within one day's march of *Srinagar*.

From this information, insufficient as it was, we were obliged to abandon the idea entertained of visiting *Cédárnáth* and *Badarinath* on this occion, for our time was too limited to take the lower and more easy road, and I feared the upper and desert one, on account of the people who were already much exhausted by daily marching for a month running, and on whom even two night's exposure had made a considerable impression. When this was evident, and when it was considered that this excursion would be prolonged to at least 8 days, during which the cold and fatigue would at least equal that of the two gone by, without the means of procuring wood to warm them, and that it would be necessary to carry provisions for these 8 days along with us, while procuring porters was a very dubious matter; it may not, under these considerations, appear unnecessary to have abandoned the further prosecution of our intentions, and I with much reluctance did so.

Similar in its nature to these desert roads, but perhaps more dangerous and dismal, is that which leads along *Shear Gad'h* and across *Dhum Dhar* to *Barassu*, one of the remotest divisions of *Kenaur*; of this route, the following account was obtained: it is wholly desart, and at all seasons lies chiefly through snow; proceeding up the ravine of *Shear Gad'h* by a steep and rough ascent, a more level part is gained, which leads to the usual resting place, a cave; the whole distance only about 4 *cos*, and the latter part entirely through snow. The 2d days journey is of nearly the same length, and like the first, in a direct northerly course, having *Beanderpuch'h* on the left hand to the south westward, while on every hand, during the day, nothing is seen but wastes of snow and sharp rock in high bare peaks; the oppression at the chest and difficulty of breathing continues great all this day, and the resting place is a cave in the snow. The 3d carries the traveller across the *Dhum D'har*, at the point where the river *Yonso* arises from its west side; and following its course for 2 *cos*, he reaches a cave in its banks, named *Thagur Sahn*. The last or part of the descent is to the north-west. From this place a day's journey carries him in a south west direction along the *Yonse*, to *Usleh*, the first village in *Barrassu*; one *cos* below *Usleh*, the village *Gangar* is situated in a southerly direction, a little to the south east of which is *Dhatmerg*. Another person made this journey in 3 days, reaching *Thagur Sah* the 2d day, and *Usleh* the 3d; he calls the distance of the first day's journey 8 to 9 long *cos*, entirely to the north, save the latter *cos*, which tends westerly.

is 12 *cos*. Several points were to be arranged before we began our march; the *brahmins* requested that no *mussulman* might be followed

The direction of the extentired and lofty range of *Bhum Dhar* is certainly very near north and south, and it is nearly as certain, from the accounts of every one who was interrogated, that the *Tonse* arises far north, on its western face, and that has a course from considerably to the north of the *Jumna*.

As no wood is to be found on such routes, those who travel along the higher and more inclement regions of the hills, are under the necessity of carrying blankets to protect them from the rigour of the cold while they lay in holes in the snow, or under stones, and eat food raw, or previously dressed; and this is probably by no means an uncommon mode of travelling, for there is a road from *Bitcher*, and particularly from the remoter provinces of that state, to *Badarinath* and *Cedar*, that lays entirely behind the ranges of hills in sight from here, and of which very little can possibly pass near the habitations of men: this is frequented both for purposes of devotion, and of traffic in salt and wool. The route adverted to in the narrative, leading along the hill of *Nehal*, and down the *Ghauri Ganga*, is probably a path diverging from this route to *Badarinath*, and indeed it is evident that the mountains are pervaded in every direction by similar cuts, though to the eye of the traveller they appear impassible.

It is related, that about 35 years ago, a band of 4 or 500 men, from *Bharatsu*, and the remoter parts of *Gerwhal*, made an incursion through the hills into the Chinese territory, with a view to plunder. I could obtain no particulars relating to their route, or to the time it occupied, but they effected their purpose, bringing back a good many sheep. If this be a fact, it corroborates the idea that there are many more passes through the *Himalaya* range, than have come to our knowledge, or than are generally supposed, through which it is practicable to convey at least small animals.

Further information was sought respecting those passes, and the Chinese territories, by questioning the two *Bhotias* who were brought to us at *Duraili*; they were however persons from whom much could not be expected; they were poor inhabitants of a miserable village, and had never travelled much; what they did know, however, they communicated in a way that showed they did not want acuteness, and that they understood the object we had in view in interrogating them; and being treated kindly, were well pleased to give satisfaction. They spoke a broken sort of *Hindustani*, acquired in their intercourse with the hill people, but their own language was perfectly distinct in every respect.

They stated that they were inhabitants of the village of *Chumtah*, consisting of a few poor houses in the *purgunnah* or district of *Chapring*; the chief officer (or *subadar*, as they called him) is named Catak. This village they state to be also one month's journey from hence, at the rate of 9 to 12 *cos* per day; but they evidently have no very definite notion of a *cos*. I suspect their journeys do not exceed 6 to 8 miles; some men far less, as they travel over a very difficult country, and go very slowly. They represent the road as exceedingly bad: it lies for 10 days along the bed of the *Jahnevi*, tracing it to its source, which lies in a lofty hill called by them *Sanctiau*; and its course is very winding, but chiefly from the eastward. Another stream takes its rise from *Sanctiau*, which runs to *Bisher*, and debouches into the *Setlej*, at a place they called *Hokbe*. The name of this stream, they call *Lingeen Kaid*.

Chaprang is a large town, situated in a plain where there is nothing but short grass; no wood of any sort. It is one month's journey from their village, in a northerly direction; one day's march through snow and through hills, all very bad and rugged road, the rest a level plain. In the course of this journey, they pass the *Setlej* river by a *sango* or wooden bridge; it is even then of considerable size, and it goes under the name of *Lang-gin-Thang*: but they know it to be the same stream, which, in *Bisher*, is called *Satudra* or *Setlej*.

to pass the village, which, indeed, was a measure I meant to have adopted unasked, and therefore at once agreed to. The *pandit* also represented

From *Chaprang* to *Gara* is one month's journey also, the road lying in a northerly direction along a perfect grassy plain, with many shawl goats and sheep grazing on it; they are in abundance both at *Chaprang* and *Gara*. Between these two places is situated the city of *Tuling*, through which the road lies, and which they describe as large, and where a grand LAMA resides.

It has been universally found, that the hill people exaggerate distances when stating them in *coss*, and lead one to suppose that their day's marches are very long ones, when in fact they are exceedingly short; and this frequently happens, from the exceedingly difficult nature of the country and roads that lead across it. Thus, I believe that, if an average of 5½ miles be allowed for the day's journey in these difficult roads, it will be found fully equal to the truth; this would make the course of the *Jahnevi* 55 miles, and the direction is probably from N. E. 5° to N. E. 80. But, as it turns much in a winding channel, and the road ascends and descends, full one-third may be taken from that scene, and that is even too little. This would place the source about 37 miles to the N. E. 70 of *Bhairamghati*; and, following the same reasoning, the village *Chounsah* may be double the distance further in the same direction, taking a few more miles from it, on account of greater ascents and deflexions than are to be met within a river's course—say one-third; leaving 77 miles further, or 114 from *Bairamghati*. *Chaprang* is said to be another month's journey to the N. 6° of which through hills, equal to about 33—less one-third or 22. The rest being on level ground, more must be allowed; but, by their own account, they do not travel more, even on a plain, than 6 or 6 *coss*, which they call 8 miles. *Chaprang* will then be found 212 miles to the north of *Chounsah*, and, by the same reckoning, *Gara* will be 240 miles to the north of *Chaprang*, and about 506 miles N. E. 11. 30. or thereabouts; from *Bhairamghati*. This is going on very uncertain data, but may, with other remarks and routes, contribute a trifle to fix some points in an hitherto little known country.

I was exceedingly anxious to obtain any information respecting the *Setlej* and its sources, and paid very particular attention to all they said relating to that river; no one was permitted to speak to, or look at them, and I myself paid strict regard, that no question should be put of a nature to suggest to them what sort of answer was desired, and as every word they said was spontaneous, I have some confidence in this additional evidence to that river coming from a considerable distance to the eastward, and behind the *Himalaya* range. These men, however, could not distinctly say where the stream was derived from.

Many questions were put to them relative to their manners and customs on peculiar occasions. Of marriage, they tell, that the bridegroom buys his wife at a great expence, according to his means, and much expenditure is made by his father in the ceremony, the father of the bride only furnishing the ornaments of the lady; it does not appear distinctly that much is given to the *Lamas* or priests, on occasions of marriage, as they do not officiate or attend them, even the sight of a woman being strictly prohibited them. Marriage contracts are entered into at all ages, from childhood upwards, but the wives are not carried away till the age of 15 or 16.

Of their dead, they say, that in their village, they throw their dead into the river; but this is entirely from poverty, for any one who can afford it, at least partly burns the body, and then commits it to the stream. At *Chaprang*, when any man of rank (any "*sirdar*") dies, his body is taken by persons appointed for the purpose, and beat and pounded, bones and all together, and made up into balls, which are thus given to be devoured by a very large species of *kites*, which are held very sacred, and are kept by the *Lamas*; they are fed regularly by persons (*repoys*) appointed by the *Lama*, and

that it was not customary to approach the sacred shrine with arms of any sort, and that every one performed this last stage with naked feet. As, by the general voice it was allowed, that marauding and plunder were common occurrences in this neighbourhood, I did not deem it proper or safe to go totally unarmed; but agreed, that only five men should be permitted to accompany us thus accoutred, and that I should take my own gun; but that these weapons of war should be thrown aside before we got within sight of the holy spot, and deposited in a cave near it, under a guard. I also pledged myself that no use should be made of these instruments, except in case of necessity; nor any life sacrificed either by the people or myself, from the time of our leaving the village till we returned to it; moreover, that I should not carry meat of any sort, dead or alive, along with me, but feed purely on rice and bread. They did not even suggest the putting off my shoes at the village, nor could I have done so; but I promised to throw them off when entering into the precincts of the temple, or approaching the holier places, with which they were much pleased. All the *Hindus*, including the *Gorc'has*, went from hence bare-foot.

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they are much revered and feared by the people, who do not venture to approach them. Great expence is incurred at this ceremony, many thousand rupees being given to the *Lamas*, with a sort of rich cap, of much value. The bodies of poorer people are sometimes buried, and sometimes thrown into the river. The *Lama* appears to be held in great respect: those who fail in this regard, and who do not administer the meat-offerings of grain and *ghee*, are punished by the *Mantra*; by which, the offender is placed under the influence of some spell, and rendered immoveable in the position he happens to be in, and becomes (as they term it) like stone or earth.

All disputes are settled by the *Raja* CAYOK, (he is probably called *raja* from being the chief person, on another occasion he was called *subadar*.) A person who kills another with a sword, is fixed to four places, and branded with iron or brass instruments till he dies; a thief is branded in the forehead with an iron, his goods are seized by the State, and he is driven from the country.

These *Bhotias* were short stout men, with features strongly marked with the *Tartarian* characters; high cheek bones, flat nose and face, and small eyes, the corners of which turned much upwards. They wore their hair very thick and bushy, and ending in a long plaited tail, after the manner of the Chinese. Their colour was considerably lighter than that generally remarked amongst the hill people, being a dirty yellow: their faces were much tanned, however, and wrinkled. Their cloathes consisted of a gown or wrapper, of coarse brown woollen stuff, with something like drawers of the stuff, very loose above, but bound very tight around the calf of the leg. The dress, dance, and general appearance, however, was exceedingly different from that of the *Paharias* or hill people.

[illegible] more than two *cos*, the road lay chiefly through a wood [illegible] a little above the bed of the river, the path was good, [illegible] there interrupted by a bad ſtep. At this place we [illegible] protection of a rock, which cloſes up the valley, by a rude, but curiouſly conſtructed ſet of ſteps, formed by pins ſtuck into the rock, and beams and ſtones laid acroſs them. The channel of the river became deep, dark and narrow, and the path a mere devious ſcramble, over enormous fragments of rock from above, mingled with broken pieces of trees, interlaced with tangled *jungle*, till we reached a ſmall retired ſpot, beneath ſome fine trees, where a cool ſpring, and the pleaſantneſs of the place, induce pilgrims in general to halt. The river runs below this at a depth of about 100 yards, between two walls of ſolid rock, in which it has hollowed itſelf a bed juſt ſufficient to contain it, and of which the breadth at the upper part is nearly the ſame as below, and in this trough it tumbles over a ſucceſſion of ſmall falls for a conſiderable way. Beyond this, the road is difficult, and frequently dangerous, paſſing along the face of *Scaurs*, in the beds of torrents, acroſs rocks, and over a ſucceſſion of broken ground, till we reach the top of a very ugly and dangerous deſcent, which is ſaid to be [illegible] *cos* from the village, and which leads immediately down upon *Bhairavi* [illegible].

At this point the *Bhágirat'hi* is divided into two branches—that which preſerves the name, coming from the eaſtward; while the other, of a ſize fully equal, joins it under the name of the *Jahnevi*, from the [illegible]th-eaſt. Both theſe rivers run in chaſms, the depth, narrowneſs, and wildneſs of which, it would be far from eaſy to convey an idea of; between them, a lofty crag, equal in heighth to thoſe that tower on either ſide above the torrents, is thruſt like a wedge. The extreme precipitouſneſs of all of theſe, the roughneſs of their faces, with the wood which grows near their baſes, obſtructed the view, and prevented the [illegible] being comprehended at a glance; but the diſtant black cliffs,

topped with lofty peaks of ſnow, are diſcerned ſhutting up the proſpect in either of the three ravines, when the clouds for a moment permit them to appear. Juſt at the bottom of the deſcent, and immediately above the junction of the two torrents, an old and crazy wooden bridge is thrown acroſs the *Bhágirat'hi*, from one rock to the other many feet above its ſtream, and it is not till this point is reached, that the extraordinary nature of the place, and particularly of the rivers bed, is fully comprehended; and then is ſeen the ſtream in a ſtate of dirty foam twiſting violently, and with a mighty noiſe through the ſtrongely hollowed trough of ſolid granite, cutting it into ſhapes of every ſort and leaping in fearfull waves over every obſtacle.

THE bed of the *Jahnevi* is at leaſt equally pictureſque and fully as ſavage, but we had not equal opportunities for ſeeing it; the perpendicularity and heighth of the rocky ſides is perhaps greater than that of the others; this river is ſaid to have its riſe in a very lofty mountain, called *Rakeſúr Stan*, ſituated in the dominions of China, and which is 15 day's journey from hence in a direction nearly that of its apparent courſe from hence, viz. north east by east, I am inclined to think it is ſtill more eaſterly, and by no means ſo diſtant.

JUST at the wooden bridge abovementioned, there is an overhanging rock, under which worſhip is performed to *Bhairamji*, and a black ſtone partly painted red, is the image of the God, and here not only were prayers ſaid and worſhip performed, but every one was obliged to bathe and eat bread baked by the brahmins, as preparatory to the great and effectual ablutions at the holy *Gangotri*.

FROM this place we aſcended the rock between the ſtreams, by a path more curious and dangerous than any we have met with. The

rock is too steep and perpendicular to afford any natural path, and the chief part is therefore artificially constructed in a manner before alluded to, by placing beams of wood and stones upon strong timbers driven into the fissures of the rock; thus forming a hanging flight of imperfect steps over the fearful gulf below; and as this sometimes has suffered from age or weather, and as sometimes the means of attaching it to the rock were scanty, or altogether awaiting the means of passing are as frequently so insufficient and hazardous, as to strike dread into those not much accustomed to such travelling—at times a leap is necessary to reach the next sure footing while the precipice and torrent gapes below; at others, all the support that presents itself to save you from this fall, is a ledge of the rock not three inches broad, with a slight bamboo, hung from some root above to take hold of. By this unpleasant path, we reached a spot on the first ledge of the mountain where in a thick grove of fir trees, a small temple is placed to *Bhairamji*. It is a plain white building erected by AMBA SINH T'HAPPA, who gave a sum of money to be laid out on repairs of the road and places of worship here and at *Gungotri*. Having paid our respects to this deity, we continued our road along the right bank of the river, by a path equally bad as that of one ascent, and still gradually ascending among fragments of rock and wood, which made our progress painful and dangerous.

THREE *cos* of this description of path brought us opposite the debouche of a considerable stream called *Miáni-ci-G'had*, which tumbles down a deep ravine, through the opening of which is seen the snowy range of *Miáni*, with the extensive bosom of snow that feeds the stream. Just below this, we had a view of a very singular and lofty peak called *Rudru Himála Bahin*, a prodigious spire of bare rock, the top of which was enveloped in snow. Just opposite to the stream of *Miáni*, we obtained bearings, both upwards and downwards of the

rivers courſe, and for the firſt time the ſcite of *Gungotrí*, with the ſpot where the river ariſes, was pointed out by the pundit; this laſt was nearly directly eaſt. The path now became very laborious and our progreſs very painfull. One *cos* from *Gungotrí*, and two from *Miání-ci-G'had*, we reached a ſpot called *Patangni*, which is noted as that where the five brothers, commonly called the *Pánduwán*, BHÍM SINH, ARJUN, YUDHISHT'HIR, SAHADEO, and NACULA, remained for twelve years worſhipping MAHADEO, after his retreat from *Lanca*. After that period they left this place and aſcended *Swergárohini*, a peak of the ſacred hill whence the *Ganges* flows: there four of the brothers died, and their immortal parts aſcended to heaven; but *Yudhiſh'thir*, without taſting the bitterneſs of death, or quitting his earthly tenement was aſſumed body and all. Within a gun ſhot of *Gargotrí*, the *Cédár Ganga* a rapid and conſiderable ſtream, ſaid to have its riſe in the *Cédár* mountain 12 *cos* diſtant, debouches into the *Bhágirat'hi*, and the place of confluence called *Gauri Cunda* is holy, and ſerves as a further preparatory ablution 'ere *Gangotrí* be approached.

THE ſpot which bears the name of *Gargotrí*, is hid from view by the roughneſs of the ground, and the maſſes of fallen rock: ſo that it cannot be ſeen till cloſe upon it. The hills which form the river's bed, and which the whole way from *Bhairamghát'i* are exceedingly precipitous and cloſe, here recede a little; and without loſing any thing of their ſavage grandeur, admit ſomewhat of a leſs confined view, and more of the light of day. Juſt above the debouche of the *Cédár Ganga*, the bed widens into a ſmall ſhringly ſpace, in which the river rolls with great rapidity, changing its courſe as the floods direct it. At the gorge of this ſpace, a bridge is thrown acroſs, formed of two parts, the interior ends of the beams reſting on a large rock in the center; and juſt above this bridge, in a bay formed in this ſtringly ſpace, is ſituated the ſmall temple or *Mat*, dedicated to the goddeſs GANGA or

GANGA. In former days, there was no temple made with hands for her worship; but within these few years, as has been observed above, the piety of AMER SINH T'HAPPA, chief of the *Go'cha* conquerors, provided a sum of money (from 4 to 500 rupees) for the erection of this small building.

THE temple now built, is situated about 15 feet above the stream and precisely on the sacred rock on which it is said *Bhagira'th* used to kneel, worshipping *Maha Deo*; it is a small building of a square shape from 15 to 20 feet high, much in the usual form of pagodas, rounding in towards the top; it is very plain, painted white with small dull red mouldings, and surmounted with the usual round and scolloped ornaments of such places; from the eastern face of the square which is turned nearly to the sacred source, there is a small projection covered with a stone pent house roof, and in the eastern end of this, is situated the entrance to the pagoda; and just before this entrance there is placed a small pagoda shaped temple to *Bhairamji*. The whole is placed in a small enclosure, surrounded by a wall built of unhewn stone and lime, within which also there is a comfortable but small house built for the accommodation of the brahmins who come to officiate. Without the enclosure are two or three sheds constructed of wood, called *Dharm Salas* (or charity houses) built for the accommodation of Pilgrims who resort here; and there are many caves all around, formed by overhanging stones, which yield a shelter to those who cannot find room in the sheds.

THE scene in which this holy place is situated, is worthy of the mysterious sanctity attributed to it, and the reverence with which it is regarded. There is not here the confined gloomyness of *Bhairamghat'i*; the bare and peaked cliffs that rise to the sky, yield not in ruggedness

or heighth to any we have ſeen, their ruins lie in wild chaotic maſſes at their feet, more ſcanty wood relieves their nakedneſs; even the dark hive more rarely roots itſelf in the deep chaſms which time has worn. Thus on all ſides is the proſpect cloſed, ſave in front to the eaſt; where from behind a maſs of bare rocky ſpires, four huge lofty ſnowy peaks ariſe. Theſe are the peaks of *Rudra Himála*.

The firſt and moſt natural object of enquiry, after caſting a glance over the general landſcape, is to aſcertain whence the river ſprings. Here, as at *Jamnotri*, we were told, that no mortal has, or can go further in its bed towards its ſource, than this ſpot; and this difficulty is indeed ſufficiently apparent. I made a trial to gain a point about twelve furlongs off, beyond the temple, for the purpoſe of obſerving the courſe of the river, and of ſeeing *Gangotri* in another point of view; but having, with conſiderable difficulty, made my way for ſome diſtance over the unſteady fragments, at the riſk of being precipitated into the ſtream, I was forced to turn back; beyond that point, the precipices deſcend more abruptly to the water's edge: and, in all probability, it would be nearly impoſſible to make way along their faces. Croſſing the ſtream, to take advantage of the eaſier places that may occur on either ſide, is out of the queſtion: it is too large and rapid;—and climbing higher up the mountain ſide is equally ſo, for the crags increaſe in ruggedneſs and ſteepneſs till they end in ſnow. It may be, that enterpriſing perſons remaining at this ſpot for ſeveral days or weeks, might explore or form a path towards the ſource, for time and patient perſeverance can do much, and has in fact, formed the path hither; but I am convinced not only of the difficulty of the thing itſelf, but that it would not be eaſy to overcome the reluctance of the hill people to aſcend, whoſe aſſiſtance would be ſo neceſſary to ſtrangers, and whom ſuperſtition and religious prejudice have hitherto kept below.

THE source is described as about 5 miles horizontal distance from the temple, in a direction nearly S. E. 85; and it is, in all probability, chiefly supplied by the melting of the great bosom of snow that terminates the valley, and lies between the peaks of the mountain spoken of above. This mountain, reckoned the loftiest and largest of the snowy range in this quarter, and probably yielding to none in the whole *Himála*, obtains the name of *Rudra Himála*, and is supposed to be the throne or residence of MAHA'DEO himself. It has five principal peaks called **Rudra Himála*, *Brahmápuri*, *Vishnupuri*, *Udgári Cantá*, and *Swergárohiní*. These form a sort of semicircular hollow, of very considerable extent, which is filled with eternal snow; from which, and from the various ravines of this hollow, the principal part of the stream flows. Probably there may be smaller hollows to the right above *Gangotri*, which supply a portion. Such is the amount of the pundits account, and I believe it to be consistent with truth, for the following reasons. Our ascent from the village of *Suc'hi*, which is itself high among the hills, has been great, and from *Durâli*, rapid; so much so as to leave no doubt that this spot is far elevated above the level of the countries beyond the snowy hills, indeed our perpendicular distance from the snowy region was very inconsiderable, and were it not that the heat of the place is increased by the confinement of the suns rays, and their reflexion from so much rock, it is probable that snow would continue lying here continually. The cold consequently is great here at night. The river *Setlej* certainly comes through the *Himála* range; but when we were upon its banks, and at a very considerable distance within the range of snow, it was a long days journey, or probably equal to 12 miles of regular gradual ascent from the river to the region of snow, and the heat both night and day was intolerable; nay at *Serán*, 3 miles above its bed the cold was

* It also bears the name of *Panch Parbat*, from its five peaks, and *Sumeru Parbat*, which must not be confounded with that springing from *Benderpuch'h*, and sometimes the general appellation of *Gilás* is given.

inconſiderable. It muſt then be allowed that the difference of altitude indicated by theſe circumſtances is a ſtrong preſumptive proof that the *Bhágirat'hí* does not come through the ſnowy range, but riſes in them.

If it does not come through the *Himálaya*, its courſe cannot be far from hence. The ſnowy peaks extend to no great breadth; they generally conſiſt of one lofty ridge cut into high peaks and deep ravines, and project ſeveral equally irregular ridges on either ſide towards the north eaſt and ſouth weſt; theſe inferiour ridges are never equal in height to the parent mountain, but nevertheleſs at times ſhoot up maſſes of great magnitude, whence in their turn diverge other mountains that either themſelves or by their branches reach the plain.

The breadth of the mountainous region may probably occupy a ſpace of from eighty to one hundred miles: the grounds for ſuppoſing this to be the extent of that ſpace, are not only our own obſervation, but the information we have received from different and intelligent perſons, relative to routes through the paſſes.* Thus reaſoning from probabilities, obſervation and information, *Rudra Himála* is at leaſt removed to the center of the ſnowy range, and it is fair to conclude that the land, mountainous and elevated as it is, rather falls than riſes to the north and north eaſt of this mountain. This is confirmed by the pundit, and thoſe zemindars who have been accuſtomed to view the country from lofty ſituations on either ſide of the glen of the *Bhágirat'hí*. No one ſeemed in the leaſt to doubt the fact, that the river had its riſe in the aforeſaid hollow of ſnow; and ſome went ſo far as to aſſert that, when climbing in ſearch of ſtray ſheep, they had ſeen the glen of the river ending thus, and could diſcern the deep ra-

* In the *Nití Mana* paſs, after paſſing *Badarinath* which is about the center of elevation, that is to ſay, the higheſt elevated ſpot on that road, the plains are reached in three days.

vine through which it trickles down into its bed from the ſnowy baſon: and further declare that no very conſiderable ſtream appeared to join it from any other quarter. The road before adverted to, by which the *Biſcher* men go to *Cédár* for ſalt, proceeding behind this mountain was quoted by the pundit as a proof, that the river did not come from a greater diſtance, and he mentioned ſeveral corroborating accounts given by *Bhotias*, who had travelled much in this quarter.

To all this may be added, that the ſtream of the *Bhágirat'hí*, though large and rapid, is perhaps not greater than may be accounted for by the large maſs of ſnow that ſupplies it, acted on by rain and ſun, at a time of year when both have greateſt effect; and that few ſtreams of any conſequence join it above the *Jahnevi*; the *Shewri-Gad'h*, the *Miáni Gád'h*, the *Bougi Gád'h* and the *Cédar'Gangá*, being the only ones from the ſouth eaſt, while from the north weſt ſide, not a ſingle ſtream larger than a mere rill, falls into it; all of which renders it probable, that few if any *nullahs* unite with the river above *Gangotrí*, and that it really is formed as above deſcribed.

It has been ſaid, that the appearance of the bed of the river and hills cloſing up our view confirmed the information we received. About two furlongs beyond *Gangotri*, a point on the left from the northward ſhuts out the immediate view of the ſtream; beyond this, probably about one mile, (or leſs of horizontal diſtance) a point from the ſouthward ſtretches down behind the former, hiding a larger and higher portion of the bed and ſides; beyond this the courſe is to all appearance ſtraight for a conſiderable way to the ſouthward of eaſt, and a very rough craggy ridge ſhooting into ſharp points forms the eaſtern bank, and ends in a point, round which the river again appears to turn, and which ſtretches down from *Swergárohini*.

SWERGÁROHINI' is the neareſt of the five peaks, and forms the weſtern point of the great ſnowy hollow. *Rudra Himála* forms the eaſtern point: but from it a great ſhoulder runs down to the ſouth weſtward, that as far as we could judge gives off, or ends in the mountains we are ſurrounded with, and forms a great unbroken though unequal ſnowy ridge, that bounds and confines the glen of the *Bhágirat'hi*.

THE other peaks mentioned above form different points in the back of this immenſe hollow, and all together compoſe one of the moſt romantic as well as largeſt mountains, perhaps in the world. The above diſcuſſion and explanation may ſeem tedious and exceſſive; but when the object is to throw every poſſible light on even the remoteſt, and leaſt important part, of the courſe of this venerable river, tediouſneſs may perhaps be pardoned.

THE old popular idea, that the *Ganges* iſſues from a rock like a cow's mouth, *(Gae Muk'h)* did not fail to occur to me, and enquiries were made into the origin of this fable. When it was mentioned, the pundit laughed and obſerved, that moſt of thoſe pilgrims who came from the plains put the ſame queſtion in ſeveral ſhapes; one aſking whether it did not take its riſe from the leaves of a ſacred birch, *(Bhojpatr;)* others from its roots: and others again ſuppoſing, that the ſtream really and viſibly came down from heaven. But he gravely aſſured us that no ſuch thing happened, and that the river, in truth, came from the ſnow as above mentioned. He then gave the account above detailed, adding, that it was the true one given in the *Sáſt'ras*, and that he was convinced of its correctneſs not only for that reaſon, but (ſhewing the landſcape before us, and pointing to the five peaks, as in evidence of what he advanced,) becauſe, as might be ſeen, it could not well be otherwiſe.

So far as the people of the place—pundit, brahmins, and zemindars were questioned, merely about their own district and the places contiguous, their answers were distinct and prompt, with every appearance of being correct to the best of their apprehension. But when any attempt was made to carry them further abroad, or to collect any thing of the topography of the country beyond this great range, they failed altogether: either at once saying they knew nothing about the matter, or giving improbable inconsistent accounts. Some of them asserted, that there was a plain and well cultivated country at no greater distance than 12 *cos* (horizontal distance) from the other side of *Rudra Himala*; but, from the nature of the country it was not possible to reach it, except by a very circuitous route. But whether they alluded to the great plains of **Tartary*, or to some intervening valley, it was impossible to discover. They however asserted, that it might be seen from some of the high peaks in the neighbourhood, which I must believe to be false, or at best very doubtful: as I think there cannot be any means of ascending a point high enough to afford such a view from any place near this spot.

FROM the time we entered the bed of the river above *Suchi* one species of stone has chiefly predominated. A hard white stone pervaded more or less with black spots, streaks and stars, and frequently with mica; the structure is remarkable, and though the colour, the composition, and proportion of the ingredients vary, still it is quite the same stone; I am much inclined to believe it is a sort of granite.† It is much like that stone first met with in the *Paber's* bed, though in general

* If such a plain do exist, it cannot well, I think, be near the great plains on the N. E. and E. of the *Himálaya*, as the routes we have obtained from more creditable authorities, imply the existence of a far greater extent of hills stretching even to the southward of *Kamrúa*. The plain was reported, I think, to be directly behind the *Cédar* mountain, which is continuous with, indeed, a part of *Rudra Himála*, and did not belong to *Gerwhál*.

† This conjecture has been since fully justified, as scientific men have pronounced the specimens to be true granite.

whiter: some pieces are purely so; others spotted with jet like particles; others with long black bars, irregularly crossing each other; some with mica in a grey bed; some with dark black or blue veins, some slightly red, some yellowish, and other specimens grey. In the river bed, from *Suchi* to *Durali* it was found in large rounded irregular masses, but from that village to *Gangotri*, the whole mass of the mountains seems to be composed of it, and the bed of the river from a mile or two below *Bhairamghati* is formed in a solid mass through which an irregular trough has been hollowed by the continual action of the water, just broad enough for the stream to rush in a succession of falls and rapids. Its waters are quite loaded with a quantity of white shining sand, which doubtless is produced by the attrition of the stones rolled along this channel, and their gradual and constant action on the sides and bottom of this rock.

The night we arrived, fatigue was sufficient to prevent much further exertion, and combined with cold to suspend the intentions even of the pious, and a night's rest under the roof of one of the *Dharam Salas*, was very acceptable.

The whole of the next day (the 20th July,) was occupied by the people in bathing in the holy stream, and the worthy pundit made a considerable harvest from the zeal of the party; indeed, it was a matter of serious consequence and great joy to every one that had thus happily reached a place of such super-eminent sanctity, where, in fact, the act of ablution is supposed to cleanse from every sin heretofore committed; while the supposed difficulty of reaching it is so great, that few but professional devotees ever attempt the pilgrimage. It is, we find, customary for those who have lost their father or mother, to submit to the operation of shaving, and the changes this produced

on the party, were whimsical: even the mustachios were not spared; one chief means of grace, was frequently walking round the holy temple, and in this easy mode of obtaining it, it was observed that the most noted rogues were most forward—some were wonderfully indefatigable.

THE outside of the temple has been before described—within, there are three images, one of them, I think, was of CÁLÍ; and the stone shelf on which they were placed, was wet and soiled with the offerings presented: a peculiar and very strong smell was perceptible, but I know not what it was; the place is, as usual in *Hindú* temples, lighted by a lamp which yielded but a sickly gleam—no daylight had admittance—no sign of riches was perceptible, either in the temple or on the person of its priest—no tinsel even glittered on the images, which were formed of black stone, and were painted. The pundit was a smart little man, cloathed like the rest of the hill people in coarse woollen cloth: he wore a red velvet cap upon his head, which had been presented to him by some pilgrim from the low country. The truth is, that though the shrine of *Gangotrí* is the holiest of those to be met with in this sacred range, it is the least accessible, and consequently has fewer votaries; for those coming from the low country choose rather to take a comparatively easy road, and proceed to a more splendid and better frequented shrine, that of *Badarínát'h* which is thus far better endowed, and the officiating priests of which are in much better worldly circumstances, than those of *Gangotrí*. The pundit complained much of this defalcation, which he said was partly owing to the state of the country from the *Gorc'ha* conquest: as, since that period the roads being neglected, and no provision being made for the necessary repairs, it was a matter of some difficulty to reach the shrine in safety; and this being once known, had an immediate effect in deterring even those who might else have attempted the journey.

We had now ſtaid the full time we could afford, and had not, in fact, proviſions for another day; preparations were therefore made for our return, and on the morning of July 21ſt, we ſet off for *Durâli*.

The morning was clear and lovely, and the ſnowy peaks of *Sumêru Parbat* ſhone forth in full glory, illuminated by the riſing ſun. Our route was the ſame as that we came by. Gooſeberry buſhes were abundant the whole way, but the fruit was ſmall and ſour. Several trees of cedar were pointed out* to us by the brahmins, but they were not abundant; it appeared the common red cedar, and is called by the natives *D'hûp*: they regard it as very ſacred. Our *Hindû* attendants each carried away a little piece of it given by the brahmins.

July 22*d*.—About 12 o'clock we left *Durâli*, and reached the village of *Suc'hi*.

July 23*d*.—The morning was exceedingly foggy, with much drizzling rain which indeed had fallen the whole night: we left the village at 7 o'clock, and deſcended to the river by a ſteep ſtony path through ridges of cultivation, and croſſed it by a bridge ſuſpended upon two rocks; it is here very rapid, and enters between banks more confined, than oppoſite and above the village. From hence the road leads along the face of the eaſtern, or left bank, rough, ſtony and difficult, climbing up rocks, when the paſſenger's only hold is by roots of trees, and exceedingly uncomfortable from wet. Somewhat below the bridge, we paſſed the debouche of *Rindi Gâdh*, which ſtream we croſſed, deſcending from *Ch'hâyâ Cânta*.

* It appears upon enquiry, that from the time we entered *Gerwhâl*, on croſſing the *Mistal* nullah near *Lakhamandl*, on the firſt day's journey, that we have travelled entirely in *Rewâen* till we croſſed the paſs at *Ch'hâyâ Cânta*, when we entered upper *Tacnaur*, which occaſionally was attached to *Rewaen*, and ſometimes formed a different *Amil*.

AFTER a mile and half further of similar road we reached and crossed *Loid Gad'h* by a wooden bridge, a stream which has a course from *Jaundi* a snowy hill, through 5 *cos* of desart country, and is large and rapid.

THE rocks here resume their stratiform appearance pointing as before to the southward, and their structure has changed. A little further on we crossed the river again on *Loárnád-ca-Sangó*. It here winds much, running very rapidly between the banks which approach each other close and are very precipitous and rough; the road which at first carried us clambering up and down the precipices with much toil, now winds along the foot of one of its banks.

JUST below the bridge, there is a very rapid descent in the river's bed, for near a mile, in which space though there is no absolute cascade of any magnitude, yet the declivity is so steep, that the river tumbles over it the whole way, with a noise like loud continued thunder, in a mass of dirty foam: at the end of this rapid, we again crossed the river, to the left bank, by *Datráni-ca-Sangó*, which is very long, narrow, and insecure.

THE road from *Loárnád-ca-Sangó*, is very painful and difficult, leading entirely over the high piled ruins of the rocks above, and much tangled with thorns, while it rises and falls continually till we reach *Dungalo-ca-Sangó*, on which we crossed the *Bhágirat'hí* for a fourth time to-day. Just above this bridge, we saw the debouche of *Canauli Khola* above, called *Cedar Gád'h*, which is, in fact the same into which, the streams from *Banfuru Ghát* and *Sath-kiar-Tol'hí* flow. A little below the bridge, and in a small nullah, not far above the river's bed, the village *Bangheli* is situated, and on the left bank a little further on, a small village, *Uri*, is seen, and from thence begins the *T'hát* or district

of *Cat'húr*. Two miles further carried us to a nullah called *Cúrmi-ci-Gád'h*, the bed of which we ascended, to get round a high rock that projects into the river's bed; the ascent was exceedingly toilsome and dangerous, its length a mile and a half: another descent to *Elgú Gad'h*, which we crossed with difficulty, and an ascent from its bed, brought us to the village *Teár*, our resting-place for the night.

Our perambulator, which had accompanied us through the hills, became so shattered and crazy at *Duráli*, that we could make no further use of it; a considerable annoyance, as we must calculate the distance by time, and from point to point: from *Suc'hí* to *Teár* it cannot be less than 16 miles.

It was mentioned, that the men of *Duráli* village were all absent when we arrived there; it was ascertained indeed, that the object of their journey was plunder, and to-day we understood, that they had actually succeeded in driving away 4 or 500 sheep and goats from the district of *Cat'húr*. Just after crossing *Dángalo Sango*, we overtook a large party of men, amounting probably to 100, armed with *axes, bows and arrows, who, it appeared, had come from a village called *Reit'hal*, thus accoutered, to way-lay, and rob, the thieves of their booty. Their information however was too late, and the plunder was safely carried of. When questioned, they answered without the least hesitation, nor affected to conceal their intentions; when told that such misdeeds would draw on them the vengeance of government, and that probably twenty or thirty of them would be hung; they shewed neither the affectation of shame or contrition for the offence, nor fear of its

* Every *Paharia* carries an axe, called by them *Dangra*, which is small, and worn stuck in the *reverbend* in a manner similar to that in which the *Gurc'has* wear their *Cuerís*. The *Dangra* is like the *Cuerí*, the weapon of the soldier, the husbandman, or tradesman—useful in all cases. Few of them, had *talwárs*; they are not originally a hill weapon, and are all imported from the plains.

punishment, nor in any way evinced a sense of the justice or injustice of the consequence pointed out to them, but coolly answered, "it is well, as the *sircar* shall please."

July 24.—THE morning was chill and cloudy, but many of the snowy summits appeared on the opposite side of the river, with deep ravines streaked with snow, descending from their bosoms, carrying their streams to the river. A few small villages are seen near the river, on their skirts—*Teár* itself is small and poor; the houses are chiefly covered with grass; slate is probably scarce of a good quality, and wood is only used to cover the temples.

WE left the village at half past 7; just beyond it the prospect down the river opens, several villages with a good deal of cultivation appearing. A various and irregular road, passing *Shewár-ci Gad'h*, and through the wretched village of *Cúsin* led us to *Palu*, a village situate on a projecting point high above the river, upon which, and in the valley, there is much cultivation. Two miles and a half of a similar road, including another ascent and descent in crossing *Gatú Gád'h*, carried us to *Reit'hal* * which is a large village and looks more thriving

* From the village of *Reit'hal*, the lower road strikes off from *Gangotri* to *Cédarnat'h* and *Badarinat'h*. The first day's journey takes the traveller to a cave called *Sheati-ci-Udár*, 10 *cos*, the road is tolerably good in a southerly direction—one steep ascent.

Second day's journey to *Cat'húr*, 12 *cos*, course southerly—half ascent, half descent.

Third day's journey to *Billang*, full 14 *cos*, direction to the east—considerable ascent and descent, but road good.

Fourth day's journey to *Powali Danda*, a desart hill: resting-place, a cave: 10 *cos*—much ascent, but good path.

Fifth day's journey *Terguji Narain*, 9 *cos*—3 *cos* level, 6 *cos* of descent to the eastward.

Sixth day's journey to *Gauri Cunda*, 7 *cos*—ascent and descent to the eastward. There is at this place a hot spring, which is led through a brass mouth fixed in the rock, where pilgrims bathe.

Seventh day's journey to *Cedar*, 10 *cos*—great ascent, but good road. The temple to MASHA'DEO is said to be of considerable size; situated very near the snow, upon a spot of level ground on the mountain, which is in fact, a part of that called *Rudra Himlāa*—a sacred stream called *Cáli Ganga*, has its rise here, and joins the *Alacánanda* at *Rudraprayág*. There are, at this place, eleven *Daram Salas* for the use of pilgrims. From *Cédarnat'h* to *Badarinat'h*, although the distance horizontally be little, it requires eight days to go; forced marches will do it in six, three days of which are nearly entirely a return backwards; then an ascent nearly, it is said, in the same direction. The perfect impracticability of the country occasions this necessary detour.

than uſual; it was from hence that the chief part of the robber band we yeſterday met, iſſued. Several ſmaller and larger ſtreams now flow on either ſide to the *Bhágirat'hi*, the names of which it is of little importance to mention; one large one, the *Jal-Gád'h* debouches oppoſite to *Reit'hal*. Purſuing our way, we paſt *Notarna* and *Doár*, poor ſmall villages, and traverſed ſeveral fields of ridged cultivation, further on we paſſed through *Gúſali*, a tolerably neat and large village, containing from 15 to 20 houſes, chiefly thatched with graſs. A temple covered with wood was alſo obſerved, but the Chineſe appearance of the houſes, the lofty towers and enormous projecting wood or ſtone roofs, are wearing faſt away and the houſes aſſume more of the look of common Hinduſtance huts. The wretched village of *Jacolla*, is ſomewhat more than 2 miles by the road, but not above one, of horizontal diſtance from *Gúſali*, and we reached it croſſing two nullahs by a ſtony rough and diſagreeable path.

HERE we reſted for the night, and in very miſerable accommodations; theſe have been found worſe as we got nearer the low country, the houſes are dirty, cloſer, and more full of vermin.

SINCE leaving *Teár*, our route has led through the diſtrict of lower *Tacnaur*. The mountains in this day's march have loſt ſtill more of their rough ſavage appearance; they ſlope occaſionally more towards their baſes, and are frequently wooded far up: cultivation is more common, villages more frequent, and the predominating colours of green and yellow, give a far more cheerfull caſt to a country, that however can only ſeem leſs wild by contraſt with that we have left.

July 25.—THE night was rainy, and the morning as uſual, cold, wet, and comfortleſs; and we found that, through ſome miſtake of our

guides, or our attendant KISHN SINH, we have taken a wrong road, which is considerably more toilsome than that which leads across the river from *Teár*. In the one we were about to enter on, we were informed that, considerable obstacles would present themselves from the rise of one or two large nullahs, the temporary bridges of which had been carried away by the floods. Directions were given to erect others for our passage, but the indolence and natural slowness of these people, in the common business of life is so great, that we could place little reliance on their exertions, and we set off without any certainty of reaching *Bárthal* that night.

THE manufactures of *Biseher* are remarkably superior to those of *Rewaen* and *Tusnaur* both in material and workmanship; the blankets and woollen stuffs of the former, are frequently of great fineness, close in texture and of considerable beauty, while those of the latter are coarse, unsightly and bad; the wool of the former, is of a fineness equal to some of our best English wool, while the produce of the latter countries appears to partake of the character of hair, and the thread spun from it is bristly stubborn, and rather calculated to produce a coarse hair cloth, than any comfortable warm woollen fabrick; the reason of this difference, is even less explicable than that of others, and it is to be feared has its origin only in natural indolence and sloth. For pasture at all events is equally good in *Rewaen* as in *Biseher*, and one breed of sheep would in all probability thrive there as well as another, seeing that they succeed perfectly well in a similar climate.

THE superior state of agriculture was notorious in every district of *Biseher* through which we passed, and cannot entirely, though it may in some measure, be referred to the more untoward and impracticable nature of the countries now under discussion. The houses in the former are also more calculated for comfort in general than those of the

latter, though this difference is more perceptible, internally than externally.

The circumstances in which these countries or districts are placed, though they appear to be pretty similar, differ perhaps in some points; and it is but fair to state them, as it is possible the difference of character, above remarked, may in some degree at least be referred to them.

The *Gorc'has* have ruled in *Gerwhál* for near twelve years, previous to which a severe contest had been maintained, which drained the country of men and money. They appear to have borne in mind, in their subsequent conduct to this unfortunate State, the trouble it cost them to win it, and acted as if determined to revenge it. Its old families were destroyed; all those persons of rank and importance who were taken, were murdered or banished; its villages burnt or destroyed; and great numbers of its inhabitants were sold as slaves. The remaining part were oppressed by heavy taxes: and many voluntary banishments and emigrations took place, to avoid a tyranny too oppressive to be borne, and too powerful to be withstood. Thus, throughout great part of *Gerwhál*, the traveller sees but the ruins of villages, and the traces of former cultivation now abandoned: while, the inhabitants that remain, are, in all probability, the most ignorant and the lowest; and it may fairly be presumed, have sunk lower in exertion and mind, from the oppression they have groaned under.

The *Gorc'has* have only succeeded in subjecting the state or province of *Bifeher*, within these 3 or 4 years past, and its subjection was far less complete than that of *Gerwhál*. The conquerors have had less time, less opportunity, and probably saw that they dared less to destroy the country and villages, or murder and disperse the inhabitants; the remoter districts they scarce penetrated into, and the certainty we trace

through the whole of *Biſcher* the marks of the *Gorc'ha* violence, and the proofs of their temporary power in forts and ſtrongholds ſtill; the former are far leſs obvious than in *Gerwhäl*. It may be inferred from this, that the ancient ſpirit of liberty and reſiſtance is leſs beat down, and the mental energies leſs depreſſed in this ſcene of recent, and ſomewhat milder conqueſt, than in that of long eſtabliſhed tyranny.

It appears too, that *Biſcher*, even in the remoteſt parts, has kept up a greater and more general commercial intercourſe than its neighbouring provinces: the courſe of the *Setlej*, paſſing through even its wildeſt diſtricts, and communicating with the plains of *Bútan* on the one hand, and thoſe of the *Panjab* on the other; give facilities for, and encouragements to trade, not poſſeſſed by the north weſtern parts of *Gerwhal*. Many more perſons reach the plains of *Hinduſtan* from *Biſcher*, and many merchants frequent it in return. Whilſt, except a pilgrim to *Jumnotri* or *Gangotri*, none ever come or go to the countries in which theſe are ſituated.

At 9 o'clock we left *Jucolla*, detained till then by heavy rain, and marching a very ſhort way along the hill face, we deſcended for upwards of a mile to the river's bed, by a very ſteep rough and ſlippery path, which there winds along its bank, following the inflexions of the ſtream, till we croſſed *Selcour Gad'h*, oppoſite which there are three village one above the other on the other ſide, below them a ſmall nullah falls into the river. Hence our road ran for a conſiderable diſtance, partly along rice cultivation, and partly along ſome flat table land which we now met with, a little elevated above the river bed in the hollow of each reach; paſſed *Jum-cá-Gérh* an old houſe or fort, projecting into the river on the oppoſite ſide, formerly a place of conſiderable ſanctity, and where one of the many ablutions preſcribed to the religious on the way to *Gangotri* was performed; juſt below,

Jum ci-Gâd'h empties itſelf into the river; ſomewhat further on, upon the road (ſtill on the right ſide of the river) we paſſed the ſmall and poor village of *Inú* where we ſaw ſome of the largeſt peaches, I remember ſeeing either here or at home; we reckoned this place at leaſt 5½ miles from *Jacolla*.

THE path ſtill leads along the river bank, occaſionally on rice grounds and at times through thick, tangled, but ſmall jungle to *Goárí-gád'h*, about 2 miles further on, a deep and rapid ſtream which we forded with difficulty and purſued our courſe to *Kíní Gád'h*, a large and deep torrent much ſwelled by the rains. Over this *C'holla*, which is fully 9 miles from *Jacolla*, the zemindars had gone to place a temporary bridge. We were detained a full hour, till it was ready, and a moſt frail fabrick it was when finiſhed, conſiſting of two ſmall round ſticks extending from the left bank to a large rock in the middle, from which, to the other bank, three ſimilar ones tied together gave a moſt limber and unſteady mode of tranſit; ſuch was the machine on which 50 or 60 perſons, many with heavy loads were to croſs a wild mountain ſtream: by care however, although it bent till the wood touched the ſtream, we ſucceeded tolerably well: the ſteadineſs of theſe hill people in preſerving their footing though heavy laden, in difficult ſituations, is really ſurprizing; only one accident happened, but it was a fatal one. One unfortunate *cooly* miſſed his ſtep from the reaction of the timber, and fell into the ſtream; ere a hand could reach him, he was ſwallowed up and carried away in a moment to the junction of the nullah, with the river, about 150 yards below, where his head for a moment appeared ſeparated from his load, but the foaming current of the *Bhágirat'hi* here tumbling over large rocks, with great noiſe, ſeized him and hurried him along with its tremendous torrent.

FROM the bed of *Kíní Gád'h*, by a winding irregular road, we reached the top of the valley or reach, where *Barahát* is ſituated, At the

upper extremity on this (weſt) ſide, we paſſed the temple of *Lukhajurú*, ſacred to SÍVA, and another to DURGÁ. Somewhat further on, on the oppoſite bank, is ſituate the village *Mandhal*, and a very ſhort way below it *Jóſot*. *Barahát* is no great diſtance below this laſt, and is ſituated on the right or N. W. bank of the river, on a ſmall ſtripe of level land, which commences at the top of the reach, and lays at the foot of a high hill. It is a wretched place, conſiſting of five or ſix poor houſes ſurrounded with filth, and nearly buried in a jungle of nettles, thorns, and every rank weed, the produce of a dunghill; the people looked as poor and wretched as the place.

TRADITION, for it may be ſaid to amount to that, ſays, that *Barahát* was a place of note and wealth, containing 50 or 60 ſhops in its bazar, (a large number for a hill town,) and ſituated in the midſt of a rich well cultivated country, abounding in corn and cattle of all ſorts: it was alſo a place of much ſanctity, and this is the only relique of its former ſelf to be diſcerned. Even its temples, however, are in a *miſerable ſtate of dilapidation, though they ſtill abound with brahmins and fuqeers. *Dat'hatri* is ſacred to SÍVA—*Murli Manur* is either the name of a temple or the deity it is ſacred to; PARSERAM has his ſhrine; and *Suc'hi-ca-Mandir* (the temple of SUC'HI,) contains the famous *Triſul* or trident. There are alſo many holy pools for ablution, as *Suraj Cund*, *Brahmá Cund*, *Viſhernath*; all formerly frequented by pilgrims on their way to *Gangotri*, whoſe worſhip and adoration there was acceptable, in proportion as they purified themſelves by frequent ablutions, at the ſacred ſtages on their upward way. Still they are frequented, but by no means as in former days; indeed, the difficulties thrown in the way of travellers during the ſway of the *Gorc'has*, and the deterioration of the roads, have rendered *Gangotrí* a place of far leſs reſort than formerly. All theſe temples, bathing places, and reli-

* The Earthquake of 1803.—Aſiatic Reſearches, vol. xi. page 476.

gious buildings of every deſcription, as well as the town itſelf, now preſent a melancholy picture of ruin and decay; even the *Dharam Sálas*, and proviſions of charity, have not eſcaped. There were ſeveral fields and rich ſpots of land, attached to the temple of PARASURAM, for the purpoſe of feeding the pilgrims during their ſtay here: but they have all either been taken from it, or are laying waſte.

July 26.—AFTER a moſt uncomfortable night and procuring the means of carriage for the baggage with conſiderable difficulty, we proceeded on our journey, but went in the firſt inſtance to view the temples and places worthy of notice; but in fact little remains to detain the traveller, ſave the trident, which is ſurely a curious ſpecimen of the taſte of the old time. Its three-fold compoſition, the elegance of its ſhape, and the unknown characters, that occupy much of its ſhaft, point it out as a ſingular object of admiration, intereſt, and ſpeculation, for by what means it came there muſt I ſuſpect remain quite an undecided point. This pillar has been ſo minutely deſcribed (I have underſtood,) by Meſſrs. WEBB and RAPER, that it is perfectly unneceſſary to repeat here what they muſt have ſaid.

AT the turn of the river forming the end of that reach in which *Barahát* is ſituated, there is a *jhulia* or hanging bridge of ropes, over which leads the direct road to *Srinagar*; below, the valley becomes broader, and ſtretches down in a weſterly courſe for ſeveral miles.

LEAVING the *Jhulla* on our left, we wound along by a water courſe, carried for the purpoſe of irrigation from *Barahát-ci-gád'h*, which we croſſed and aſcended to *Barahát* village, about 2 miles from *Barahát*. It has been a large village and it enjoys a fine proſpect over all the valley, but upon this, as on the rich cultivation and villages of this valley, the hand of deſolation has fallen, and left little but ruins.

JUST about *Lak,hajárú* the *Bh'igirat'hi* begin to aſſume ſomewhat more of the character of a great river, ſpreading out into a wider channel, yet ſtill retaining much of the impetuoſity of the mountain torrent, and it ſweeps in numerous windings, through this fine valley which is from 3 to 4 furlongs broad, and conſiſts chiefly of table land, probably the bed it once ran in, and is here and there finely ſwelled into riſes; all is cultivable, and evidently has once been under tillage, and remains of villages in various places evince a once more numerous population; all now is waſte, but green and ſmooth.

Two or three miles from *Barahâti*, we croſſed the *Rat'hor-gâd'h* where we ſuffered conſiderable detention, while a temporary bridge was thrown over: ſomewhat further on, ſcrambling along the river ſide, we reached a ſmaller ſtream *Sinhoti-gad'h*, which we forded with much difficulty, for it was deep and ſtrong. This nullah ends the long reach and valley, and we paſſed two or three bad ſteps, where the banks cloſe for a ſhort ſpace, before entering on another, about 2 miles long, in the middle of which the village *D'hûnda*, is ſituated, on a rock overhanging the water, about 7 miles from *Barahât*. The river flows now in a uniform courſe, till it is joined at the bottom of the reach by *Dhunâri-gâd'h*, a large ſtream which flows through a valley apparently rich in cultivation. The oppoſite ſide of the river forms part of *Dhunâri* purgunnah, and there is much rice and tillage all around.

AT *Dhûnda* village we left the river and aſcended the hill behind it, firſt by a gradual eaſy path, along ledges of cultivation, till we turned the edge of the hill, when a ſucceſſion of pretty ſharp aſcents and deſcents through fir covered hills, carried us to the village of *Petará*, our night's ſtage.

THE village of *Petárá* is not much better calculated to accommodate travellers, than thoſe we have lately paſſed through, poor and dirty

but bad as the lodgings and fare were, weariness and hunger made them acceptible. Our march we reckon at only 12 miles, but heat and bad roads made it toilsome.

July 27.—The situation of the village is lofty, and the view from it extensive and beautiful, particularly down the course of the *Bhágirat'hí*: we recognise from hence too several points, which formed objects of observation in our course up the *Jumna*, such as the peaks of *Bugi* and *Murmá*. Below, the *Gadul Gad'h* flows through a fine valley, and joins the *Bhágirat'hí* at *Dharasu*: from whence, the river runs in a long and comparatively broad valley, well cultivated and studded with numerous villages. Beyond, the eye stretches to the hills above *Áthúr*, and even those near *Srinagar* are to be discerned.

The road from the village to *Dharasu* is entirely descent; this place was formerly of some religious consequence, but now is totally in ruins; it is situated on a rock, near the confluence of the *Gadul Gad'h* with the *Bhágirat'hí*. Just at the bridge by which we cross this nullah, there is a temple to Bhyrám Guru, where two *jogis*, a man and a woman, reside, for the benefit of pious pilgrims, who are expected to contribute to their support. Rising from the bed of the stream, and proceeding a mile onwards, we reached *Baret'hi* village, situated on a rising ground, at the upper end of the valley: a short way from hence, there is an establishment of *Jogis*, who reside at the temple of Mangalanath, where, there are some uncommonly fine mango trees, but the fruit was hardly ripe.

There are several villages on either side of the river here: those on the north east bank are in *Jul* pergunnah: that of *Oudepore*, commences on this side at *Gadul Gad'h*.

FROM *Barethi*, our path lay along this fine valley, pleasant and easy; the river runs chiefly on the eastern side to the debouch of the *Nagun Gád'h*, a pretty copious stream, from near *Marma-ci-Dhar*. At this point, two opposite *Dhárs* approach and interrupt the range of the valley, which, however, continues to the south eastward, till shut out by intervening points from the view, though less level and fertile than that we have passed through.

AT this point, we left the *Bhágirat'hi* entirely crossing the *Nagun* nullah, and ascending *Jaudagang-ci-D'hár:* on the face of this hill, we found many trees of the *Tejpat*, (*Laurus Cassia*,) the flavour of which was very good and powerful; it is the same with that tree, the leaves and skin of the roots of which forms an article of trade, from *Nepál* and the lower parts of the hills with the lower provinces, and mentioned by Colonel KIRKPATRICK: it was perfectly wild and seemed tolerably abundant. Our ascent continued, chiefly through wood, occasionally along a bare hill side, and now and then along rice cultivation near small water courses passing several villages, and frequently very steep and painful till we reached *Creessu-ci-D'hár* continuous from the westward with *Marma*, and fully 4½ miles from the place where we left the river, we reckoni from 10½ to 11 from *Petárá*. The whole road was wearisome and irregular, and this gorge is very highly elevated, the wood towards the top, besides the common fir, consists chiefly of the long leaved oak, and a species of rhododendron frequently mentioned before, a very extensive view is commanded from hence, but not a peak of the snowy range was visible; deep and dark clouds rested on them.

FROM this gorge a steep descent commenced, at first through deep red soapy soil, and then in the bed of a stream called *Bel-ci Gád'h*, which rises in the pass. We passed along some scanty rice cultivation, and though the miserable ruined village of *Macrora*, and reached that

of *Bhalu*, after a very fatiguing deſcent. It is ſmall, but tolerably clean, and formed our place of lodging for this night. There is nothing worthy of obſervation here, it is one of 7 villages forming the *Bhalu* diviſion in the *Joupore* diſtrict.

July 28.—At 7 o'clock we left *Bhalu*, the path deſcending rapidly in the bed and ſtream of the *Bel* or *Bhal Gad'h*: oppoſite the mouth of this nullah, but yet a long way off *Sowa'hola-ci-Tiba*, was obſerved, a high hill, juſt above the *Dun*; the path croſſing and recroſſing the ſtream, which is large from heavy rain, was painful and unpleaſant; a little below, the ſtream is increaſed by *Sinhalo-ci-Gad'h*, from a wild glen in which are ſituated three villages, belonging to *Bhalu* diviſion. Still further on *Mathal Gad'h* alſo joins, and the whole, about 2 miles from *Bhalu*, takes a weſterly direction, uniting with the *Jamli Gad'h*, which comes in a weſterly direction from *Dhanauli ci-D,hár*. The whole waters of the two vallies, at firſt under the name of the *Jamli Gad'h*, and afterwards called the *Agloha Gad'h*, flow weſtward to the *Jumna*.

Croſſing the end of *Macrel ca-Danda*, which forms the point between the *Bél* and *Jamli-Gad'hs*, and croſſing the latter ſtream, we began to aſcend and paſſed through little dirty villages, *Dangolo* and *Bahimo*; theſe form a part of the *Daſjola* purgunnah, and the latter we reckoned 3 miles from *Bhalu*.

The hills now were green and rather bare of wood, the houſes had totally loſt all appearance of the *Chineſe* ſtyle of building, degenerating into the common poor *Hinduſtani* hut. The dreſs of the women as well as the men, had began to change even at *Bárahát*, where occaſionally cotton cloth inſtead of blanket and woolen was obſerved; here cotton is the univerſal material of dreſs, ſometimes coloured and checked, and the cotton ſkull cap is in general uſe.

A STEEP and hot ascent led us by the miserable village of *Gorono*, from whence the path lay on the left hand hill side to a rough wooded descent, and the bed of a dry nullah; hence a very steep zig-zag ascent brought us to the top of a heighth whence we enjoy an extensive view, and trace the whole valley we have crossed, from its rise in *Dhanauli*, nearly to its debouché at a village called *Gerh*, by the *Jumna*, where it has changed its name, from the *Agloha*, to the *Pália-Gádh*. The range of *Marma-ci-D'hár* forms the northern boundary of this large valley, sketching from *Jount*, and its hills, in the westward, by *Goessu* in the eastward, and forming the *Seuri* and *Dhanauli-ci-D'hárs*, and stretching to the *Bhágirat'hi*; this long range, in its course gives off many subordinate *D'hárs*, which form valleys, that find a general outlet to the *Jumna* through the *Agloha-Gádh*.

FROM this station we kept along the face of the hill, for about a mile, where turning sharp to the left a short but rough descent brought us to the village *Belu*; this is a small and poor place, but as there are no other resting places between it, and *Nágel* in the *Deyrah Dun*, said to be a distance of 12 miles, we were forced to content ourselves with remaining for the night, and probably it was as well to give our weary people some extraordinary rest, as the march for the next day, to *Deyrah*, was described as a long and fatiguing one.

July 29.—WE rose early and got on foot by six, to encounter our day's fatigues. THE road wound along the left hand side of the hill on a rocky path formed entirely of lime stone, to the head of a valley one side of which is formed by the *Sowac'hola-ci-Tiba*; the place is called *Mugra*: it is a dark, gloomy, wooded ravine, and in it there is a perennial spring of remarkable coldness: it is one and half miles from *Belu*. From this place, a sharp ascent brought us to a point in the crest of *Sowac'hola-*

ei-Tiba: and all the beautiful *Dun*, and the ſtill more lovely and ſmiling plains of *Hinduſtan*, burſt full upon our view.

FROM hence, we obtained a ſhort laſt glimpſe of the ſnowy hills, and of the peak of *Benderpuch'h*. *Haridwar* too was ſeen, and ſeveral other points we could not certainly identify.

THE latter part of the deſcent is precipitous and rocky: from the foot of the hill, we paſſed along the beds of ſeveral ſmall nullahs, which are only formed by the heavy rain, and through the thin jungle that covers the riſing grounds at the foot of the hills, till we reached *Nagel*, a ſmall village; not far in the plain; from hence the path to *Dey a* is plain and level, through cultivation and mango topes, leaving *Kalunga*, on our left. I regretted much that I could not viſit this place; but neither weather nor time permitted; it is indeed too well known to need deſcription; neither does the town of *Deyra* require to be deſcribed, and in fact having only paſſed through it, I could give no adequate idea of the place. It is about 6 miles from *Nagel*; the diſtance of *Nagel* from *Bélu*, I cannot ſo well determine, but am inclined to conſider it at leaſt 7 or 8 miles, ſo that our concluding march was at leaſt from 12 to 14 miles.

THE next morning we left the *Dun*, which was chiefly under water, by the *Kearu* paſs, and reached *Saharunpore* on the night of the 30th of July.

IV.

OF THE MURDERERS CALLED P'HANSIGARS.

BY DOCTOR SHERWOOD,

Communicated by Colonel McKenzie.

WHILE Europeans have journeyed through the extensive territories subject to the Government of Fort St. George, with a degree of security no where surpassed, the path of the native traveller has been beset with perils little known or suspected, into which, numbers annually falling, have mysteriously disappeared; the victims of villains as subtile, rapacious, and cruel, as any who are to be met with in the records of human depravity.

THE *Phánsigárs*, or stranglers, are thus designated from the Hindustani word *P'hánsi*, (a) a noose. In the more northern parts of *India*, these murderers are called *T'hegs*, (b) signifying deceivers: in the Tamul language, they are called *Arí Túlúcar*, (c) or mussulman noosers: in Canarese, *Tanti Callerú*, (d) implying thieves who use a wire or catgut noose: and in Telagu, *Warlú Wahndlú* or *Warlú Vayshy Wahndloo*, (e) meaning people who use the noose.

THERE is no reason to believe that Europeans were aware of the existence of such criminals as *P'hánsigárs*, until shortly after the conquest

(a) پھانسی
(b) ٹھگ
(c) உறிகாரன்
(d) [illegible]
(e) [illegible]

of *Sirangapatan*, in 1799; when, about a hundred were apprehended in the vicinity of *Bangalore*. They did not engage general attention; nor would it appear that they were suspected to belong to a distinct class of hereditary murderers and plunderers, settled in various parts of *India*, and alike remarkable for the singularity of their practice, and the extent of their depredations. In the year 1807, between *Chittoor* and *Arcot*, several *Phánsigárs* were apprehended, belonging to a gang which had just returned, laden with booty from an expedition to *Travancore*: and information was then obtained, which ultimately led to the developement of the habits, artifices, and combinations of these atrocious delinquents.

The *Phánsigárs* that infested the south of *India* a few years ago, were settled in *Mysore*, on the borders of that kingdom and the *Carnatic*, in the *Baloghat* districts, ceded to the Company by the Nizam in 1800; and they were particularly numerous in the *poliums* of *Chittoor*. The sequestered part of the country, which comprehended these *poliums*, maintaining little intercourse with the neighbouring districts, abounding in hills and fastnesses, and being immediately subject to several *polygars*, afforded the *Phánsigárs* a convenient and secure retreat; and the protection of the *polygars* was extended to them, in common with other classes of robbers, in consideration of a settled contribution: or, which was more frequent, of sharing in the fruits of their rapacity.

It is impossible that such criminals as *Phánsigárs*, living by systematic plans of depredation, could long remain in the same place in safety, unless their practices were encouraged or connived at by persons in authority. Hence, after the establishment of the Company's Government over the *Carnatic*, and the districts ceded by the Nizam, and the consequent extinction of the power and influence of the *po-*

lygars, some of whom had succeeded in rendering themselves virtually independent of the former government, these murderers very generally changed their abodes, and frequently assumed other names.

While they lived under the protection of polygars and other petty local authorities, and among people whose habits were in some respects analogous to their own, it was unnecessary to dissemble that they subsisted by depredation. They and their families lived peaceably with their neighbours, whom they never attempted to molest, and between whom there subsisted a reciprocation of interest in the purchase and disposal of the plunder which the *P'hánsigárs* brought with them on returning from their expeditions. Afterwards, on the extension of the English Government, it was usual for the *P'hánsigárs*, while they continued their former practices, ostensibly to engage in the cultivation of land or some other occupation, to screen themselves from suspicion to which they must otherwise have been obnoxious.

P'HA'NSI'GA'RS never commit robbery unaccompanied by murder, their practice being first to strangle and then to rifle their victims. It is also a principle with them to allow no one to escape of a party, however numerous, which they assail, that there may be no witnesses of their atrocities. The only admitted exception to this rule is in the instance of boys of very tender age, who are spared; adopted by the *P'hánsigárs*; and, on attaining the requisite age, initiated into their horrible mysteries.

A gang of *Phánsigárs* consists of from ten to fifty, or even a greater number of persons; a large majority of whom are Mussulmans: but Hindu's, and particularly those of the Rajput tribe, are often associated with them. Bramins, too, though rarely, are found in the

gangs. (f) Emerging from their haunts, they ſometimes perform long journeys, being abſent from home many months, and prowl along the eaſtern and weſtern coaſts to *Hyderabad* and *Cape Comorin*. In general, however, they do not roam to ſuch a diſtance; but make one or two excurſions every year. Their victims are almoſt excluſively travellers whom they fall in with on the road. Each gang has its *ſirdar* or leader, who directs its movements. Of a numerous gang, ſome uſually remain at home, while the reſt are engaged in the work of pillage and murder. Thoſe that are abroad are often divided into ſeparate parties of ten or fifteen perſons; who either follow each other at ſome diſtance, or, the parties taking different routes, they rendezvous at an appointed place in advance; meaſures being at the ſame time taken to ſecure a ſpeedy junction of the gang, ſhould this be requiſite for the purpoſe of attacking ſeveral travellers at once. Different gangs ſometimes act in concert, occaſionally appriſing one another of the approach of travellers whoſe deſtruction promiſes a rich booty.

P'HANSI'GARS have the appearance of ordinary inoffenſive travellers, and ſeldom aſſume any particular diſguiſe. They indeed not unfrequently pretend to be traders; and there is reaſon to believe, that they ſometimes come from the *dekhin* clothed in the garb of *bairagis*. Formerly, when *P'hánſigáry* was practiſed to a greater extent, and in a more daring manner than at preſent, the leader, eſpecially if enriched by former ſpoliations, often travelled on horſeback, with a tent, and paſſed for a perſon of conſequence or a wealthy merchant: otherwiſe, he appeared at firſt in a more humble character, and aſſumed in the courſe of his rapacious progreſs one of more importance, as he became poſſeſſed of horſes and bullocks; which, while they afforded him carriage for the plundered property ſubſerved the purpoſe of giving countenance and ſupport to his feigned character.

(f) Brahmins, it is probable, do not aſſiſt in the actual perpetration of murder, but are employed to procure intelligence, in obtaining which their peculiar privileges afford them great facilities.

P'HA'NSIGA'RS are accuſtomed to wait at choultries on the high roads, or near to towns, where travellers are wont to reſt. They arrive at ſuch places and enter towns and villages in ſtraggling parties of three or four perſons, appearing to meet by accident and to have had no previous acquaintance. On ſuch occaſions, ſome of the gang are employed as emiſſaries to collect information, and eſpecially to learn if any perſons with property in their poſſeſſion are about to undertake a journey. They are often accompanied by children of ten years of age and upwards; who, while they perform menial offices, are initiated into the horrid practices of the *P'hánsigárs*, and contribute to prevent ſuſpicion of their real character. Skilled in the arts of deception, they enter into converſation and inſinuate themſelves, by obſequious attentions, into the confidence of travellers of all deſcriptions, to learn from them whence they come, whither and for what purpoſe they are journeying, and of what property they are poſſeſſed;—thus,

> " —— under fair pretence of friendly ends,
> And well placed words of glozing courteſy,
> Baited with reaſons not unplauſible,
> Wind them into the eaſy-hearted man;
> And hug him into ſnares.

When the *P'hánsigárs* determine, after obtaining ſuch information as they deem requiſite, to attack a traveller, they uſually propoſe to him, under the ſpecious plea of mutual ſafety, or for the ſake of ſociety, to travel together; or elſe they follow him at a little diſtance, and, on arriving at a convenient place, and a fit opportunity preſenting for effectuating their purpoſe, one of the gang ſuddenly puts a rope or ſilk round the neck of the unfortunate perſon, while others aſſiſt in depriving him of life.

Two *P'hánsigárs* are conſidered to be indiſpenſably neceſſary to effect the murder of one man, and commonly three are engaged. There is ſome variation in the manner in which the act is perpetrated, but the following is perhaps the moſt general. While travelling along, one of

the *Phánsigárs* ſuddenly puts the cloth round the neck of the perſon they mean to kill, and retains hold of one end, while the other end is ſeized by an accomplice; the inſtrument croſſed behind the neck is drawn tight, the two *Phánsigárs* preſſing the head forwards; at the ſame time the third villain, in readineſs behind the traveller, ſeizes his legs, and he is thrown forward upon the ground. In this ſituation he can make little reſiſtance. The man holding the legs of the miſerable ſufferer, now kicks him in thoſe parts of the body endowed with moſt ſenſibility, and he is quickly deſpatched.

Antecedently to the perpetration of the murder, ſome of the gang are ſent in advance and ſome left in rear of the place, to keep watch and prevent intruſion by giving notice, on occaſion, to thoſe engaged in the act. Shouldany perſons unexpectedly appear on the road, before the murdered body is buried, ſome artifice is practiſed to prevent diſcovery, ſuch as covering the body with a cloth while lamentations are made profeſſedly on account of the ſickneſs or death of one of their comrades; or one of the watchers falls down, apparently writhing with pain, in order to excite the pity of the intruding travellers and to detain them from the ſcene of murder.

Such are the perſeverance and caution of the *Phánsigárs* that a convenient opportunity not offering, they will ſometimes travel in company with, or purſue perſons whom they have devoted to deſtruction, ſeveral days before they execute their intention. If circumſtances favor them, they generally commit murder in a jungle or in an unfrequented part of the country, and near to a ſandy place or a dry water courſe. A hole three or four feet in depth, in ſuch a ſpot, is dug with facility; in which the body being placed, with the face downwards, it is ſhockingly mangled. Deep and continued gaſhes are often made in it in both ſides, from the ſhoulders to the hands and to the feet, which lay open

the abdomen, and divide the tendon at the heel. Wounds are also made between the ribs into the chest; and sometimes, if the hole be short, the knees are disjointed and the legs turned back upon the body. The hole is then filled with earth. The body is thus cut and disfigured to expedite its dissolution, as well as to prevent its inflation; which, by raising or causing fissures in the superincumbent sand, might attract jackals, and lead to the exposure of the corpse. When the amount of the property is less than they expected to find, the villains sometimes give vent to their disappointment in wanton indignities on the dead body.

If, when a murder is perpetrated, a convenient place for interring the body be not near, or if the *P'hánsigárs* be apprehensive of discovery, it is either tied in a sack and carried to some spot, where it is not likely to be found, or it is put into a well; or, which is frequently practiced, a shallow hole is dug, in which the corpse is buried, till a fit place for interring it can be discovered; when it is removed and cut in the manner already mentioned. If the traveller had a dog, it is also killed; lest the faithful animimal should cause the discovery of the body of his murdered master. The office of mangling the dead body is usually assigned to a particular person of the gang. The *P'hánsigárs* are always provided with knives and pickaxes, which they conceal from observation.

From the foregoing account it will be obvious, that the system of the *P'hánsigárs* is but too well adapted for concealment. The precautions they take, the artifices they practice, the mode of destroying their victims, calculated, at once, to preclude almost the possibility of rescue or escape—of witnesses of the deed—of noise or cries for help—of effusion of blood—and, in general, of all traces of murder:—these circumstances conspire to throw a veil of darkness over their atrocities.

I now proceed to notice various particulars, more fully illuſtrating the practices, habits, and character of theſe criminals.

It is not improbable that formerly a long ſtring, with a running nooſe, might have been uſed by *P'hánsigárs* for ſeizing travellers, and that they robbed on horſeback. But, be this as it may, a nooſe is now, I believe, never thrown by them from a diſtance, in this part of *India*. They ſometimes uſe a ſhort rope, with a loop at one end; but a turban or a *dot'hi*, (a long narrow cloth, or ſuch worn about the waiſt,) are more commonly employed; theſe ſerve the purpoſe as effectually as a regularly prepared nooſe, with this advantage, that they do not tend to excite ſuſpicion. When ſuch a cloth is uſed, it is, previouſly to applying it, doubled to the length of two, or two and a half feet, and a knot is formed at the double extremity; and about eighteen inches from it, a ſlip knot is tied. In regulating the diſtance of the two knots, ſo that the intervening ſpace when tightly twiſted, may be adapted to embrace the neck, the *P'hánsigár* who prepares the inſtrument tries it upon his own knee. The two knots give the *P'hánsigárs* a firm hold of the cloth, and prevent it's ſlipping through their hands in the act of applying it. After the perſon they attack has been brought to the ground, in the manner already deſcribed, the ſlip knot is looſed by the *P'hánsigár* who has hold of that part of the cloth, and he makes another fold of it round the neck; upon which, placing his foot, he draws the cloth tight, in a manner ſimilar to that (to uſe the expreſſion of my *P'hánsigár* informer,) "of packing a bundle of ſtraw."

Sometimes the *P'hánsigárs* have not time to obſerve all the precautions I have mentioned in cutting and interring a body; apprehenſions for their own ſafety inducing them to leave it ſlightly buried. Sometimes, alſo, when a murder is perpetrated in a part of the country

which expoſes them to the riſk of obſervation, they put up a ſcreen, or the wall of a tent, and bury the body within the incloſure:—pretending, if enquiries are made, that their women are within the ſcreen. On ſuch occaſions theſe obdurate wretches do not heſitate to dreſs and eat their food on the very ſpot where their victim is inhumed.

If, which ſcarcely ever happens, a traveller eſcape from the perſons attempting to ſtrangle him, he incurs the hazard of being diſpatched by one of the parties on watch. Should he finally eſcape, or ſhould any other circumſtance occur to excite alarm, or apprehenſions of being ſeized, the gang immediately diſperſes; having previouſly agreed to re-aſſemble at an appointed time, at ſome diſtant place.

Travellers reſting in the ſame choultry with *P'hánsigárs* are ſometimes deſtroyed in the night, and their bodies conveyed to a diſtance and buried. On theſe occaſions a perſon is not always murdered when aſleep; as, while he is in a recumbent poſture, the *P'hánsigárs* find difficulty in applying the cloth. The uſual practice is firſt to awaken him ſuddenly with an alarm of a ſnake or a ſcorpion, and then to ſtrangle him.

In attacking a traveller on horſeback, the *P'hánsigárs* range themſelves in the following manner. One of the gang goes in front of the horſe, and another has his ſtation in the rear; a third, walking by the ſide of the traveller, keeps him engaged in converſation till, finding that he is off his guard, he ſuddenly ſeizes the traveller by the arm and drags him to the ground; the horſe at the ſame time being ſeized by the foremoſt villain. The miſerable ſufferer is then ſtrangled in the uſual manner.

Against *P'hánsigárs* it muſt be obvious, that arms and the ordinary precautions taken againſt robbers, are unavailing. When a perſon is

armed with a dagger, it is usual for one of the villains to secure his hands. It sometimes happens, that a party of travellers, consisting of several persons, and possessed of valuable effects, are, while journeying in imaginary security, suddenly cut off; and the lifeless and despoiled bodies being removed and interred, not a vestige of them appears. (g) Instances are said to have occurred, of twelve and fourteen persons being simultaneously destroyed. But such occurrences must be rare; and, in general, the property taken is not considerable. Such, indeed, are the cruelty and cupidity of these detestable wretches, that, on the presumption of every traveller possessing concealed treasure, or some property, however trifling, even indigence affords not its wonted security.

Formerly, if good horses, shawls, or other valuable articles, were among the booty, they were commonly reserved for the *polygar*, in payment of protection. A portion of the plunder was usually appropriated to defraying the expences of religious ceremonies; and, sometimes, a part was also allotted for the benefit of the widows and families of deceased members of the gang. The residue of the booty, being divided into several parts, was usually shared as follows:—to the leader, two shares; to the men actually concerned in perpetrating the murder, and to the person who cut the dead body, each one share and a half; and to the remainder of the gang each one share. The plunder was almost always carried home by the *P'hánsigárs* and sold greatly below its value;—it was never disposed of near to the place where the per-

(g) Near *Sadras*, about ten years ago, three *gelah* persons were killed, having on them money in different coins, to the amount of 16,000 rupees. In 1805, five persons were killed in *Coimbatore*, and cash to the amount of about 2,500 pagodas, the property of the collector of the district, was taken. In the same year, two respectable natives, proceeding on horseback from *Madras* to the *Malabar* coast, with five attendants, were all killed. In 1807, five persons, besides two others who had joined them on the road, were killed near *Sangahre*, and robbed of property to the amount of 1000 pagodas, belonging to an officer of engineers. And, in 1815, three persons were killed in the district of *Masulipatam*, and 2,500 rupees taken.

fon to whom it belonged was murdered, nor where it was likely to be recognized, of which the *P'hánsigárs* were enabled to judge by the information imparted to them by the credulous ſufferers.

THE frequent aſſociation of the moſt abject ſuperſtition, with the deepeſt guilt, has been often noticed. The juſtneſs of the obſervation is exemplified in the conduct of moſt—perhaps of all—claſſes of *Indian* delinquents, and remarkably ſo in that of the *P'hánsigárs*. Their ſyſtem, indeed, ſeems to be founded on the baſis of ſuperſtition. They pay the moſt ſervile regard to omens; and they never leave their abodes to go on an expedition, without a previous perſuaſion, derived from modes of devination in uſe among them, that it will be attended with ſucceſs. Though the *P'hánsigárs* are almoſt all *muſſulmans*, they have nevertheleſs univerſally adopted on certain occaſions, the idolatrous worſhip of *Hindu* deities. CÁLI or MARRIATTA, (the goddeſs of ſmall-pox of the *Carnatic*,) is regarded as their tutelary deity, and is the object of their adoration. She is uſually invoked by them under the names of JAVÍ, or AVÍ, and of TULJAPURÍ. *(h)* Before an expedition is determined on an entertainment is given, when the ceremony of ſacrificing a ſheep to JYU is performed; and though perhaps not always yet it would ſeem generally, in the following manner. A ſilver or brazen image of the goddeſs, with certain paraphernalia pertaining to her;

(*b*) Colonel COLIN MACKENZIE, ſo well known for his ſucceſsful reſearches into *Indian* hiſtory and antiquities, obſerves, in a letter to me, "that it was the cuſtom of many of the ancient heads of families, that having raiſed themſelves by depredation to rank and power, to conciliate CÁLI; hence the ſacrifices of human kind, of offerings of noſes, and ultimately of ſheep by the Rajahs of *Myſore*; and now the ſubſtitution of cocoanuts at the hill of *Myſore*, which derives its name from MAHIÁ'ASURA MARDANÁ, another name for CÁLI.

"At *Chitteldroog* alſo the ancient *polygars* worſhipped and ſacrificed to CÁLI, and even ſtill at *Tuljapúr*, on the weſtern ghauts, 300 miles weſt of *Hydrabad*, on the road to *Poonah*. I was there in March 1792. It is a celebrated temple of CÁLI, where the pooja is performed by a low tribe and not by brahmens, who abhor theſe rites. It is even ſo much ſuſpected that infamous rites and human victims were offered there, that my head bramin (the late valued *Boriah*) horror-ſtruck by the accounts he received, urged my departure from *Tuljapúr* and was not eaſy till we got away."

and ſometimes, alſo, one of GANE'SA; and the images of a lizard and a ſnake, reptiles from which preſages are drawn; together with the implements of *P'hánsigárí* as a nooſe, knife, and pickaxe, being placed together, flowers are ſcattered over them, and offerings of fruit, cakes, ſpirit, &c. are made; odoriferous powders are burned, and prayers are offered for ſucceſs. The head of the ſheep being cut off, it is placed, with a burning lamp upon it and the right fore foot in the mouth, before the image of JAYI', and the goddeſs is entreated to reveal to them, whether ſhe approves of the expedition they are meditating. Her conſent is ſuppoſed to be declared, ſhould certain tremulous or convulſive movements be obſerved, during the invocation, in the mouth and noſtrils, while ſome ſpirit is poured upon thoſe parts. But the abſence of thoſe agitations is conſidered as indicating the diſapprobation of the goddeſs, and the expedition is poſtponed.

ABOUT ten or twenty day's afterwards, the ceremony is repeated; and, if auſpicious inferences be drawn from it, the *P'hánsigárs* prepare to depart. But before they determine towards what quarter to proceed, ſome perſons of the gang are ſent on the high road, in the direction they wiſh to take, to obſerve the flight of crows and other birds, and to liſten to the chirping of lizards. Should ſucceſs be betokened, the ſame path is taken. If the ſigns be adverſe, the *ſirdar* ſends ſome of the gang to make obſervations on another road, or at a place where two roads meet; and theſe votaries of ſuperſtition proceed in that direction, which promiſes, as they infer, the beſt ſucceſs.

IN the courſe of their progreſs, they obſerve the ſame ſcrupulous regard to omens. Emboldened by favorable ones, they are greatly diſcouraged by thoſe of an oppoſite tendency. If they have not proceeded far from home, when unlucky ſigns are deſcried, they regard

them as premonitions to return:—under other circumstances they either perform certain ceremonies, or they halt for a few days, till the malignant influence, denoted by them, is supposed to be passed; or else they bend their course in a different direction. To the intervention of bad omens, a traveller, over whom destruction was impending, is sometimes indebted for his safety. *(i)*

On returning also from a successful expedition, ceremonies are performed to Jayi'.

The *P'hánsigárs* keep the *Hindu* festivals of the *Dipávali* and the *Desserah*, which they celebrate in a manner similar to that observed among *Hindus*.

A tradition is current among *P'hánsigárs*, that about the period of the commencement of the *Cali Yug*, Mariatta co-operated with them so far, as to relieve them of the trouble of interring the dead bodies, by devouring them herself. On one occasion, after destroying a traveller, the body was, as usual, left unburied; and a novice, unguardedly looking behind him, saw the goddess in the act of feasting upon it, half of it hanging out of her mouth. She, upon this, declared that she would no longer devour those whom the *P'hánsigárs* slaughtered; but she con-

(i) It would be tedious to enumerate all the omens by which they allow themselves to be influenced in their proceedings. I shall briefly mention a few of both kinds—prosperous and adverse.

The following are favorable signs:—A lizard chirping, and a crow making a noise on a living tree on the left side. A tiger appearing is deemed rather a good sign. The noise of a partridge on the right side, denotes that they will meet with good booty on the very spot, and they, therefore, are accustomed to make a halt.

These betoken misfortune:—A hare or a snake crossing the road before them. A crow sitting and making a noise on a rock or a dead tree. An ass braying while sitting. An owl screeching. The noise of a single jackal. If a dog should carry off the head of a sheep which they have sacrificed, they consider it to betoken that they will get no booty for many years.

deſcended to preſent them with one of her teeth for a pickaxe, a rib for a knife, and the hem of her lower garment for a nooſe, and ordered them, for the future, to cut and bury the bodies of thoſe whom they deſtroyed.

WHITE and yellow being conſidered the favorite colors of their patroneſs, and thoſe in which ſhe is arrayed; the cloths for ſtrangling are of one or other of theſe, to the excluſion, I believe, of all other colors.

RIDICULOUS as their ſuperſtitions muſt appear, they are not devoid of effect. They ſerve the important purpoſes of cementing the union of the gang; of kindling courage and confidence; and, by an appeal to religious texts deemed infallible, of imparting to their atrocities the ſemblance of divine ſanction.

To the aſcendancy of the ſame ſuperſtitious feeling is alſo to be aſcribed the curious circumſtance that *P'hánsigárs* are accuſtomed to refrain from murdering females, and perſons of the *Camála* caſt; which includes gold, iron, and braſs, ſmiths, carpenters, and ſtone-cutters.) Waſhermen, potmakers, pariahs, chucklers, lepers, the blind and mutilated, a man driving a cow or a female goat, are alſo ſpared. Theſe perſons appear to be regarded either as the deſcendants or ſervants of JAYI; as her conſtant worſhippers; or as having claims to the eſpecial protection of the goddeſs, and are for theſe reaſons exempted from ſlaughter.

WHEN this rule is reſpected any one of theſe perſons, travelling with others of different caſts, proves a ſafeguard to the whole party; the ſame principle which prompts the *P'hánsigárs* to deſtroy every individual of a party, forbidding them to kill any unleſs the whole.

MANY *P'hánsigárs*, who have become informers, have declared that they never knew any of the abovementioned perſons to have been deſtroyed, and conceived that no pecuniary temptation could be ſufficiently powerful to occaſion a violation of the rule. Others have ſtated that they had *heard* of a gang of *P'hánsigárs* who, having murdered a woman, never afterwards proſpered, and were at length deſtroyed. Notwithſtanding the reaſons for acquieſcing generally in the truth of the ſtatement, that women, and men of particular caſts, are ſpared, the following occurrences, in the latter of which not fewer, than nine perſons diſappeared, and who were almoſt beyond doubt murdered by *P'hánsigárs*, ſhew that their religious ſcruples on this point are, when the temptation is great, at leaſt ſometimes overcome.

IN the latter end of 1800, MOHAMED ROUS, the ſubadar who commanded the eſcort of the Reſident of *Myſore*, being ordered to join the force then forming againſt the ſouthern *Polygars*, ſent ſome of his family, among whom were two, if not three, women, to *Madras*. They were never heard of until June 1801; when a man was ſeized at *Bargalore* having in his poſſeſſion a bullock which was recognized to have belonged to MOHAMED ROUS. This man was a *P'hánsigár*; and gave a clear account of the murder, by a gang to which he belonged, of the ſubadar's family.

THE wife of KISTNA ROW, in company with his nephew, and attended by a bramin cook; two female ſervants, two private peons, and two *coolies*, ſet out from *Poonah* with four horſes to join KISTNA ROW, then at *Nagpúr*. They had nearly completed their journey, having arrived at a village about fifteen miles from the place of their deſtination, and ſent to apprize KISTNA ROW of their approach. Two perſons were ſent by him to conduct the party to *Nagpúr*; but ſubſequently to the departure of the travellers

from the village abovementioned no intelligence could be obtained—no traces whatever could be discovered of them; and though about four years have since elapsed, all enquiries have been fruitless. *(k)*.

The utility to such criminals as *P'hánsigárs* of signs, and of words and phrases not understood by others, as channels of communication must be obvious. It is accordingly found that several such are employed by them. Some of those in more frequent use I shall mention; and the catalogue might have been easily extended.

Drawing the back of the hand along the chin, from the throat outwards, implies that caution is requisite—that some stranger is approaching. Putting the open hand over the mouth and drawing it gently down implies that there is no longer cause for alarm. If an advanced party of *P'hánsigárs* overtake any traveller whom they design to destroy, but have need of more assistance, they make certain marks on the road, by which those of the gang who follow understand that they are required to hasten forwards. A party in advance also leaves certain marks where a road branches off, as intimations to those who follow of the route their comrades have taken.

The following list comprehends several slang terms and phrases in use among them. This language they denominate *Pheraferi-ci-bát*; or, as the term may be rendered, the language of dispatch or emergency.

(k) I have stated that nine persons were cut off on this occasion, though there is some reason to believe that the party consisted of even a greater number.

Kistna Row had been formerly employed in the confidential situation of Shirishtedár under Colonel Read, when this gentleman held the Collectorship of the territories ceded by *Tippoo* on the conclusion of the war of 1793. He afterwards served under Colonel Close at the Residency at *Poonah*; where he is still employed by the British Government.

Yelú .... one
Bitrí .... two
Sancód .... three
Wodlí .... four
Panchúrú .... five
Serlú and Cherú .... six
Sat'húrú .... seven
Desrú .... ten
Máhí .... one hundred
Hácadé .... one thousand
Doácadé .... two thousand
Desácádé .... ten thousand
Sitcalé .... pagoda
Burcé .... rupee
Chiltá .... fanam
Sitac .... gold
Cawúdga .... silver
Cúrp .... a horse
Cúrpání .... a mare
Newála .... sheep
Lamcáni .... a hare
Móz (*per*) .... bullock
Agási .... turban
Raclán (*per*) .... jackal
Comuda (*h*) .... cock
Comudí (*h*) .... hen
Sendrí .... coral
Pandúr-p'hálí .... pearl
Shaic'h-jí or Mohamed Khan .. } musſulman ſtranger
Bhítú .... hindu ditto
Cantger (per) .... watcher
C'halcári .... intelligencer
Worawal .... perſons appointed to ſeize horſemen
Mahí .... pickaxe
Cát'hiní .... knife for cutting the dead body
Rumál .... a handkerchief worn as a turban
Cancha (*h*) .... D'hotí (*tel*) .... } ſaſh
Newár (*h*) .... tape
Nár Muctem ....
various articles used for strangling
Sir-ghant .... chief knot
Der-ghant .... 1½ or ſlip knot
Mán .... a convenient place for murdering
Cónt .... name of an entertainment given by *P'hánſigárs* to their friends

Literally ....*P'hánſigár* acceptation
Nyamet ....A delicacy ....A rich man
Lacra ....A ſtick ....A man of no property
P'hankaná ....Ditto

Dhol ....A barber's drum ....An old man
Man j'harcer do ....Sweep the place ....See that no perſon is near
Kanta pante láo ....Bring firewood ....Take your allotted poſts
Pán ka rumal nícálo Take out the handker- Get out the doti, &c.
chief with the beetle
Pan Khaó .... Eat beetle ....Deſpatch him
Roná cero .... Implies a ſlight burial, with the face downwards, the body whole, and covered only with ſufficient earth to conceal it.
Kedbí Gidbí, Dekho, Look after the ſtraw. Look after the corpſe; that is, the *P'ha'nsígárs* proceed to a village after the ſlight burial, and ſend out the appointed perſons to bury the body properly, keeping watch that no perſon is looking.
Kedba bahir pariya .... The ſtraw is come out. Jackals have taken out the corpſe: you muſt not go that way.
Bhaváni Púter....Deſcendents of Bhowani. } *P'hánsígárs?*
——— Putúr .... Town of Bhowani Púter. }
Uſed interrogatively to aſcertain, without the riſk of expoſing themſelves, whether perſons whom they meet on their journeys, and whom they ſuſpect to be of the ſame fraternity, are ſo or not. When caution is particularly requiſite, the queſtion is

put in the latter and less suspicious shape. The first syllable *put* ascertains the point of their connexion with *Khaváni*, whilst from the termination *úr*, which signifies a town or village, they would appear to a stranger to be enquiring only about some particular place.

Phansigars bring up all their male children to the profession, unless bodily defects prevent them from following it. The method observed in initiating a boy, is very gradual. At the age of ten or twelve years, he is first permitted to accompany a party of *Phánsigárs*. One of the gang, generally a near relation, becomes his *ustád* or tutor; whom the child is taught to regard with great respect, and whom he usually serves in a menial capacity, carrying a bundle, and dressing food for him. Frequently the father acts as the preceptor to his son. In the event of being questioned by travellers whom he may meet, the boy is enjoined to give no information further, than that they are proceeding from some one place to another. He is instructed to consider his interest as opposed to that of society in general; and to deprive a human being of life, is represented as an act merely analogous and equivalent to that of killing a fowl or a sheep. At first, while a murder is committing, the boy is sent to some distance from the scene, along with one of the watchers: then allowed to see only the dead body; afterwards more and more of the secret is imparted to him—and, at length, the whole is disclosed. In the mean time, a share of the booty is usually assigned to him. He is allowed afterwards to assist in matters of minor importance, while the murder is perpetrating: but, it is not until he has attained the age of 18, 20, or 22 years, according to the bodily strength he may have acquired, and the prudence and resolution

he may have evinced, that he is deemed capable of applying the *dhoui*, nor is he allowed to do so, until he has been formally presented with one by his *ustád*. For this purpose a fortunate day being fixed upon, and the time of the *Dessérah* is deemed particularly auspicious, the preceptor takes his pupil apart and presents him with a *dhouti*, which he tells him to use in the name of JAYÍ; he observes to him that on it he is to rely for the means of subsistence, and he exhorts him to be discreet and courageous. On the conclusion of this ceremony his education is considered to be complete, he is deemed qualified to act as a *P'hánsigár*; and he applies the noose on the next occasion that offers.

AFTER his initiation, a *P'hánsigár* continues to treat his preceptor with great respect. He occasionally makes him presents, and assists him in his old age; and, on meeting him after a long absence, he touches his feet in token of reverence.

SUCH is the effect of the course of education I have described, strengthened by habit, that *P'hánsigárs* become strongly attached to their detestable occupation. They rarely, if ever, abandon it. (*l*) Some, narrowly escaping the merited vengeance of the law and released from prison under security, could not refrain from resuming their old employment; and those who, bending under the weight of years and infirmities, are no longer able to bear an active or principal part, continue to aid the cause by keeping watch, procuring intelligence, or dressing the food of their younger confederates.

THE bonds of social union among *P'hánsigárs* are drawn still closer by intermarriages. Though not of frequent occurrence, instances are

(*l*) Three are known to have engaged in the service of the Company as sepoys.

not wanting in which they have married into families deemed honeſt and reſpectable. The women are not ignorant of the proceedings of their huſbands. Perſons of mature age are very rarely admitted into the fraternity, and when this has been done, it was only after long and intimate intercourſe had enabled the *P'hánsígárs* fully to appreciate the character of their confederates.

To the influence of perſonal character are *P'hánsígárs* uſually indebted for becoming the heads of gangs. Like others, who follow lawleſs and abandoned courſes, the *P'hánsígárs* are profligate and improvident, and addicted to the uſe of *bang*; ſo that the wealth they may acquire, even though conſiderable, is ſoon waſted.

Whether any *P'hánsígár* were ever capitally puniſhed by the Nabobs of the *Carnatic*, I know not. One gang, ſettled in the polium of *Chargal*, near the *Paidnaigdrug Paſs*, between the upper and lower *Carnatic*, was apprehended about 17 years ago, and fined to the amount of 5,000 rupees by the *ſubahdar* of the province; a mode of puniſhment ſo far from being juſtifiable, that it could hardly have been impoſed except from ſordid motives: nor could it fail to give new impulſe to the activity of the *P'hánsígárs*, and to render them more than ever rapacious and ſecret in their barbarous practices.

Hyder Alli proceeded againſt theſe criminals in a very ſummary manner, and deſtroyed ſeveral of them. In the reign of Tippoo, ſome were ſentenced to hard labour, and others ſuffered mutilation of the limbs. While Purniah was *dewan* of *Myſore*, during the minority of the preſent Rajah, highway robbery being frequent, was made capital, and ſeveral *P'hansígárs* were executed.

It muſt be obvious that no eſtimate, except what is extremely vague and unſatisfactory, can be formed of the number of perſons that have

annually fallen victims to *P'hánsi'gárs* in the south of *India*. The number has varied greatly at different periods. There is reason to believe, that from the time of the conquest of *Mysore* in 1799, to 1807 and 1808, the practice of *P'hánsi'gárí*, in this part of *India*, had reached its acme; and that hundreds of persons were annually destroyed. (*m*) The great political changes, which marked the commencement of that period, and the introduction of a new system of government in *Mysore*, the *Ceded Districts*, and the *Carnatic*, though infinitely preferable to the former, yet was it in many respects less jealous and vigilant, and afforded facilities of communication before unknown between distant countries, of which the *P'hánsi'gárs* and other criminals availed themselves to overspread the country: and it may be conjectured that many persons, deprived by the declension of the *Mohammedan* power of their wonted resources, were tempted to resort to criminal courses to obtain a subsistence.

The foregoing description of the *P'hánsi'gárs* is meant to be more particularly applicable to those gangs that were settled in the northern part of the *Carnatic* and in the *Ceded Districts*, antecedently to the year 1808. Since that time, they have become well known to the *English* courts of justice, and their habits have undergone some changes. Many have left the Company's territories and fled to those of the *Nizam*, and of the *Mahrattas*. But though the number of them is greatly diminished, *Phánsi'gárs* still infest the dominions of the Company. The gangs,

(*m*) In one of his reports, he mentions of *Chittúr* observes:—"I believe that some of the *P'hánsi'gárs* have been concerned in above two hundred murders; nor will this estimate appear extravagant, if it be remembered, that murder was the profession, frequently their only means of gaining a subsistence: every man of fifty years of age, has probably been actively engaged during twenty-five years of his life in murder, and on the most moderate computation, it may be reckoned, that he has made one excursion a year, and met each time with ten victims."

Yet, Francis Bartolemeo says, in a note page 69.—"During a residence of 13 or 14 years in *India*, I never heard of any traveller being robbed or murdered on the highway." —*Travels in India, translated by* Forster.

indeed, consist of fewer persons than formerly; their plans are less systematic, their range is less ample; they roam the country more secretly; more frequently changing their names and places of abode; and adopting other precautionary measures to screen themselves from justice. Unfortunately, few of the numerous *P'hánsí'gárs* that have at different times been apprehended could be convicted, in accordance with the evidence required by the *Mohammedan* criminal law; which, admitting not the testimony of accomplices, and rarely the sufficiency of strong circumstantial evidence unless confirmed by the confession of the culprits, their adherence to protestations of innocence has alone, but too frequently, exempted them from punishment. Those that have been tried and released becoming greater adepts in deceit, have, together with their old propensities, carried with them a knowledge of, the form of trial, and of the nature of the evidence requisite to their conviction.

The habits and proceedings of the *P'hánsí'gárs* it is reasonable to conclude have been modified and varied by different circumstances and events of a local or political nature in the several states infested by them, in some places approximating more than in others to the foregoing description. There is every reason to believe, that in the *Deccan*, and more particularly in the territories of the *Nizam*, *P'hánsí'gárs* are very numerous. They will be naturally encouraged to settle in greater numbers, and to carry on their practices with less caution and secrecy, in a country, a prey to anarchy or invasion, where the administration is feeble or corrupt, or where crimes are constantly committed with impunity. It is also not unreasonable to suppose, that they may occasionally act in concert with other classes of delinquents; and that their proceedings may sometimes be of a mixed nature, partaking of the peculiarities of those with whom they may be in league. In those countries too, where *P'hánsí'ga'ri* has been long practised, it may be presumed,

that the ordinary artifices will at length become known, and as the ſucceſs of thoſe murderers muſt chiefly depend on the ignorance of travellers of their devices, they will perhaps find it neceſſary to reſort to novel and unſuſpected ſtratagems.

I HAVE heard of no inſtance in which a European was murdered by *P'hánsigárs*. The manner in which they are accuſtomed to travel in *India* is perhaps generally ſufficient to exempt them from danger; added to which, apprehenſion of the conſequences of ſtrict enquiry and ſearch ſhould a European be miſſing, may be ſuppoſed to intimidate the *P'hánsigárs*, at leaſt in the dominions of the Company. Similar reaſons influence them in ſparing coolies and parties charged with the property of *Engliſh* gentlemen, combined with the conſideration that while ſuch articles would generally be uſeleſs to the *P'hánsigárs*, they would find difficulty in diſpoſing of them, and might incur imminent danger of detection in the attempt.

THAT the diſappearance of ſuch numbers of natives ſhould have excited ſo little intereſt and enquiry as not to have led to a general knowledge of thoſe combinations of criminals will naturally appear extraordinary. Such ignorance, certainly, could not have prevailed in *England*, where the abſence, if unaccounted for, of even a ſingle perſon, ſeldom fails to produce ſuſpicion, with conſecutive inveſtigation and diſcovery. In *India* the caſe is far otherwiſe; and ſuch an event, unleſs occurring to a perſon of ſome conſequence, would ſcarcely be known beyond the precincts of the place of reſidence or the village of the unfortunate ſufferer. Many that fall victims to the *P'hánsigárs* are the ſubjects of other and diſtant ſtates: many have no ſettled abodes. It muſt alſo be remembered that *P'hánsigárs* refrain from murdering the inhabitants of towns and villages near to which they are

halting; neither are they accuſtomed to murder near to their own habitations; circumſtances which not only prevent ſuſpicion attaching to them as the murderers, and to the local authority as protecting and ſharing the booty with them, but tend to throw it upon others, who reſide near to the ſpot whither a traveller may have been traced, and where he was laſt ſeen. Beſides, a perſon ſetting out on a journey is often unable to fix any period for his return; and though he ſhould not reviſit his home at the expected time, his delay will, for a while, excite little alarm in the minds of his friends. He is ſuppoſed to be unexpectedly detained—to be ill—to have met with ſome ordinary accident—to have deſerted his family—to have died. Should ſuſpicion ariſe that he has been murdered, the act is attributed to ordinary highway robbers, and it is but ſeldom that minute enquiries can be inſtituted by his bereaved relatives. But ſuppoſing that this is done, and the progreſs of the miſſing traveller traced to a particular place and not beyond it, ſtill ſuſpicion would be apt to attach to any, rather than to a few apparently inoffenſive travellers, journeying either for the purpoſe of traffic, as is imagined: or, as is often pretended, to ſee their relations—or, to be preſent at ſome marriage; and who, if ever noticed, have perhaps been long ſince forgotten. If, notwithſtanding all theſe improbabilities, ſuſpicion ſhould fall upon the actual perpetrators, where could they be found?

Thus with reſpect to ſepoys, who, having obtained leave of abſence, never rejoined their corps, the concluſion generally formed has been, that they had deſerted—when, in various inſtances, they had fallen ſacrifices to the wiles of the *P'hānsigārs*. The ſame obſervation is particularly applicable to *golah* peons, charged with the conveyance of money and valuables; many of whom having diſappeared, no doubt was entertained that they had abſconded, and appropriated the property to their own uſe. Even the apprehenſion, which an indiſtinct idea of

danger tends to create in the minds of these and other travellers, would render them only more liable to fall into the snare. Less persuasion would be requisite to induce them to join a party of *P'hánsigárs*, prompted by the belief that they were thus providing, in the most effectual manner, for their own safety.

What constitutes the most odious feature in the character of these murderers, is, that prodigal as they are of human life, they can rarely claim the benefit of even the palliating circumstance of strong pecuniary temptation. They are equally strangers to compassion and remorse—they are never restrained from the commission of crimes by commiseration for the unfortunate traveller—and they are exempted from the compunctious visitings of conscience, which usually follow, sooner or later, the steps of guilt. "*P'hánsig iré*," they observe, with cold indifference blended with a degree of surprize, when questioned on this subject, "is their *businefs*;" which, with reference to the tenets of fatalism, they conceive themselves to have been pre-ordained to follow. By an application of the same doctrine, they have compared themselves, not inaptly, to tigers; maintaining, that as these ferocious beasts are impelled by irresistible necessity, and fulfil the designs of nature in preying on other animals, so the appropriate victims of the *P'hánsigárs* are men; and that the destiny of those whom they kill, "was written on their foreheads."

This state of moral insensibility and debasement is yet calculated to give birth to pity, while it aggravates the horror with which we contemplate their atrocities. It ought not to be forgotten, that unlike many who adopt criminal courses, the *P'hánsigárs* had not previously to divest themselves of upright principles—to oppose their practice to their feelings; but that, on the contrary, having been trained up from their childhood to the profession, they acquired habits unfitting them

for honeſt and induſtrious exertions that a deteſtable ſuperſtition lent its ſanctions to their enormities: and that they did but obey the inſtructions, and imitate the examples, of their fathers.

THE *Thegs, (n)* in the more northern parts of *India*, may be divided into three claſſes. The firſt conſiſts chiefly of *Mohammedans* who originally reſided under the protection of zemindars of large eſtates, as HURA SING, DIA RAM, &c. and in the diſtrict of *Etawah*; including alſo a few ſtragglers at other villages. The ſecond claſs is compoſed of *Hindus*, who are for the moſt part of the *Lodeh* caſt, and is much more numerous than the former. They reſided in great numbers in the eaſtern part of *Etawah*, and the adjoining diſtrict of *Cawnpore*, until alarmed by the active exertions of the magiſtrates, by whom many were apprehended. Theſe *Thegs* had long eſcaped ſuſpicion by engaging in tillage, and by always carrying on their depredations at a diſtance from home. The third claſs is more conſiderable in reſpect to number, and extends over a larger tract of country than either of the foregoing claſſes. It conſiſts of a deſperate aſſociation of all caſts, which grew up in the *Pergunnahs* of *Sindouſe* and *Purhara*, and the neighbouring villages on the *Mahratta* territories. They travel in large bodies, and are more bold and adventurous than the *Thegs* in the Company's provinces. Their predatory excurſions are chiefly confined to the country that lies to the eaſtward and ſouthward of *Gwaliar*, and to the province of *Bundlecund*.

THEVENOT, in the following paſſage, evidently alludes to the *Phánsigárs* or *Thegs*.

(n) The term *Theg* is not unknown in the ſouth of *India*, but it is not applied to the *Phánsigárs*, but to a claſs of delinquents to whom it ſeems more appropriate, viz. to cheats or ſwindlers, who, often appearing as pearl and coral ſellers, practice various fraudulent acts, particularly in ſubſtituting bad coins for good, which they receive under the pretence of giving or taking change.

"THOUGH the road I have been ſpeaking of from *Delhi* to *Agra* be "tolerable, yet hath it many inconveniences. One may meet with "tygers, panthers, and lions upon it, and one had beſt alſo have a care "of robbers, and above all things not to ſuffer any body to come "near one upon the road. The cunningeſt robbers in the world are "in that country. They uſe a certain ſlip with a running nooſe, "which they can caſt with ſo much ſlight about a man's neck, when "they are within reach of him, that they never fail, ſo that they "ſtrangle him in a trice. They have another cunning trick alſo to "catch travellers with. They ſend out a handſome woman upon the "road, who with her hair diſhevelled ſeems to be all in tears, ſighing "and complaining of ſome misfortune which ſhe pretends has befallen "her. Now as ſhe takes the ſame way that the traveller goes, he eaſily "falls into converſation with her, and finding her beautiful, offers her "his aſſiſtance, which ſhe accepts; but he hath no ſooner taken her up "behind him on horſe-back, but ſhe throws the ſnare about his neck "and ſtrangles him, or at leaſt ſtuns him, until the robbers (who lie hid) "come running into her aſſiſtance and complete what ſhe hath begun. "But beſides that, there are men in thoſe quarters ſo ſkilful in caſting "the ſnare, that they ſucceed as well at a diſtance as near at hand; and "if an ox or any other beaſt belonging to a *caravan* run away, as "ſometimes it happens, they fail not to catch it by the neck." *(o)*

TRAVELLERS in the ſouth of *India* alſo are ſometimes decoyed through the allurements of women into ſituations, where they are murdered and plundered by perſons lying in wait for them; but, whether by that claſs of criminals who are properly called *P'hinsigārs*, I am uncertain. This method, as well as that of adminiſtering intoxicating and poiſonous mixtures to travellers, is much inconſonant with the habits of the large

(o) THEVENOT's travels, part III. p. 4.

gangs, who are not accompanied in their excursions by women, may perhaps be resorted to by smaller and more needy parties, who rob near to their own abodes, or who, having no fixed habitation, continually roam with their families from place to place.

WITH respect to the practice of throwing the noose from a distance, as mentioned by THEVENOT, and which is that of the *Binjaris* in *India*, to recover their strayed bullocks, (*p*) I conclude it to be the same as was resorted to in battle (according to FIRDAUSI) by the ancient *Persians* and other *Asiatic* nations, for seizing and binding their enemies, and dragging them off horseback. The *cammand*, (literally a rope or noose,) said to have been formed of silk, or of the dried skin or sinews of animals, is mentioned in various parts of the SHAH NA'MAH. Thus, in narrating the exploits of the renowned champion RUSTUM, it is said:—

همی رفت رستم چو پیل رزم کمندی ببازو درون شصت خم

RUSTUM advanced like a furious elephant,
His *cammand* in his arm full sixty coils.

(*p*) TAVERNIER, speaking of the *Circassians*, observes:—"Ils ne se servent point de chiens ni d'oyseaux pour la chasse, & quand ils y vont ils s'assemblent d'ordinaire sept ou huit des principaux du village. Ils ont de si bons chevaux qu'a la course ils fatiguent la beste & la forcent de se rendre. Chacun tient toute preste une corde qui a un nœud coulant & c'est atachee a l'arçon de la selle, & ils sont si adroits a la jeter au col de la beste qui se rend de lassitude qu'il y en a peu qui leur echapent."—Tom I. Liv. Troisieme, Ch. XI.

The *laqui* of the *South American Indians*, enables them to strike and entangle animals at the distance of 300 paces. It is a strip of leather, five or six feet long, to each end of which is fastened a stone about two pounds weight. The huntsman, who is on horseback, holds one of these stones in his hand, and whirls the other round like a sling as swiftly as possible, in order to hurl it with more force, when he throws it at the animal he has singled out, which he is almost certain of striking.

The *laqui* of the *Spanish* peasants of *South America*, in the use of which they are [illegible] from that used by the *Indians* in having a single noose, in place of a ball at each end. [illegible] cipal weapon, for they employ it on all occasions, both in hunting and in their private quarrels. U[illegible] says, that the *Spanish* peasantry can strike and halter the object of their attack, with almost [illegible] at the distance of 30 or 40 paces; but that a small distance, such as 10 or 15 paces, renders [illegible] dexterity in some measure ineffectual,—Vide Encyclo. Brewst Art. Chili.

بیامد ز الاد بکشاد بند به فتراک بست آن کیانی کمند

He loosed AULAD (q) from his bonds,
And tied his *Kyanian* (r) *cammand* to the bow of his saddle.

که از پشت زین شان بخم کمند ربودم سر و پای کردم به بند

For from their saddles, with the noose of my *cammand*,
I tore them, and bound fast their heads and feet.

بینداخت آن تاب داده کمند بیکی سواران بسی کرد بند

He threw the well-twisted *cammand*;
And caught many a horsemen on the same spot.

چو از دست رستم رها شد کمند سر تاجدار اندر آمد به بند

When the *cammand* issued from the hand of RUSTUM,
The crowned head (s) became imprisoned.

IN the same manner as the *cammand*, the *Pa'san*, (*Tel.*) or *Pa'san*, (*Tam.*) literally a rope, was also, it is probable, used by the ancient *Hindu* heroes in war. If the authority of the RÁMÁYANA were allowed to be sufficient to establish the point, it might be asserted that there were three sorts of *Páśas* known to the *Hindus*: two, viz. the noose of justice and the noose of death, pertaining to YAMA; and one, the noose of the water, to *Varuna*. They are mentioned in the following passage among the weapons presented by VIS'WAMITRA to RA'MA.

धर्म्मपाशं तथैवास्त्रं कालपाशञ्च दुर्ज्जयं
वारुणञ्चापि तेपाशन्ददामि परमार्च्चितं

(q) A prisoner to RUSTUM in the plains of *Mazenderán*—the *Persian* region of magic and romance.

(r) From the dynasty of ancient *Persian* Kings so named.

(s) Alluding to *Khacan* or the King of *China*, who, seated on his elephant, was taken prisoner by RUSTUM in a great battle, in which the former had come to the assistance of the *Turks* against the *Persians*,—See also D Herbelot's Bib. Or. Art. Khathai, &c.

" I give thee the *Dherma-pása*, and also, the missile weapon *belonging to it*; the cruelly-conquering CA'LA-PA'SA, and the highly valued VARUN'A-PA'SA." *(t)*

SIVA is sometimes, though very rarely, represented with the PA'SA; *(u)*—VISHN'U, as HARI, is invoked in the *B'hágavat*, and said to hold it in one of his eight hands; and GAN'E'S'A, as the lord of wiles, stratagems, &c, is almost always represented with the PA'SA.

How long the country south of the KISTNA has been infested by *Phánsigárs* I know not, though it is certain that they have been settled in the *Poliums* of *Chittoor* for at least a century. On this point the *P'hánsigárs* themselves are quite ignorant, knowing in general little more than that their fathers and grand fathers followed the same horrid employment, and taught it to their children. There is however no reason to suppose that the practice in this part of *India*, is of great antiquity. It may also be a question whether to the *Hindus* or to the *Mussulmans* ought to be considered as attaching the reproach of inventing this detestable system of pillage and murder. The respect paid by *Mussulman P'hánsigárs* to the omens and modes of divination, and to the religious and idolatrous rites of the *Hindus*—a respect apparently not accidental, but which pervades, and seems interwoven with their whole system—affords grounds for the belief, that to them, rather than to the *Mussulmans*, is to be ascribed the invention.

ON the other hand it may be argued, that had these bands of murderers consisted primarily of *Hindus*, it would probably have appeared

(t) Book I. section 26.—The learned translators of the RA'MA'YANA, state that this weapon had the power of entangling or binding the foe, and suppose it to have been a kind of gun or [illegible].

(u). A print in which JAYU or SIVA, and QUNNERADI or GAN'E'S'A, are represented with the PA'SAS will be found in Picart's Customs and Religious Ceremonies, Vol. III. page 457.

that the practice was of considerable antiquity; in which case there could hardly have been that prevailing ignorance among the *Hindus* with regard to it, which is found to exist. It is a practice more in unison with the habits and customs of the *Mussulmans* than with those of the *Hindus*. The gangs at least in the southern parts of *India*, consist chiefly of *Mussulmans*, and similar practices, it has appeared, prevailed in *Hindustan* in the time of SHAH JEHAN and AURUNGZEB, and probably much anterior to the reigns of these monarchs, and have continued to the present day; and if, as I have been informed, *Arabia* and *Persia* be infested by *P'hánsigárs*, little room is left to doubt that these murderers came along with the *Mohammedan* conquerors into *India*, and that they have followed the progress southward of the *Mohammedan* arms. In support of this opinion it may be observed, further, that in the more southern provinces which were never, or which fell latest, a prey to *Mohammedán* conquerors, *P'hánsigárs* do not appear even yet to have established themselves. I have not heard of any gangs being found to the south of *Salem* in *Baramahal*; and even these, there is reason to believe, but recently migrated thither from the *Poliums* of *Chittoor*, and the zillah of *Cuddapah*. With respect to the *Hindu* usages, adverting to the disposition observable among the lower orders of both nations to adopt the rites and customs of each other, they may have been introduced and eagerly received among ignorant and superstitious offenders, ever prone to embrace a scheme which serves the purpose of tranquillizing the mind without requiring the abandonment of criminal habits, either by *Hindu* converts to *Islamism*, or by such *Hindu* criminals as retaining their religion, attached themselves to bands of *P'hánsigárs*.

RICHARD C. SHERWOOD,
Surgeon on the Establishment of
Fort St. George.

December 1816.

As a Supplement to Mr. SHERWOOD's paper on the claſs of robbers and murderers in the ſouthern parts of *India*, denominated *P'hánsigárs*, and in confirmation of the intelligence received by him reſpecting a ſimilar "claſs of criminals, under the appellation of *Thegs*, who infeſt the upper part of *Hinduſtan*," Mr. HARINGTON ſubmits to the Society an extract from an official document of a recent date.

As connected with the ſubject, he alſo lays before the ſociety an extract from the ſame document, reſpecting other deſcriptions of robbers and vagrants, in the weſtern provinces.

OBSERVATIONS

REGARDING BADHEKS AND T'HEGS,

Extracted from an offical report by MR. JOHN SHAKESPEAR, *Acting Superintendent of Police for the Western Provinces, dated the 30th April*, 1816.

THE moſt heinous robberies committed in theſe Provinces are perpetrated by gangs of *Badheks* and *Shighál Khors*. Theſe gangs are almoſt excluſively ſettled in the Diſtrict of *Aly Gher*, and in that part of the territory of the Nawab Vizier, bordering the Diſtrict of *Goracpúr*. After much inquiry I am diſpoſed to believe that the *Badheks* of *Aly Gher*, and the *Shighál Khors* of *Baraich*, are connected with each other; and are one and the ſame people; the name conſti u ng the ſole diſtinction. Excluſive of the *Shighál Khors* eſtabliſhed in country of the Nawab Vizier, the following tribes of Jackal eaters are numerous in the Weſtern Provinces:—*1ſt*, *Badheks*,—*2d*, *Kunjár*,—*3d*, *Sídia*, *4th*, *Bauría*,—*5th*, *Harbúra*. All of theſe ſubſiſt by robbi a d are

more or less attached to a vagrant life, eating the flesh of jackals, lizards, &c. When stationary, they commonly reside with their families in temporary huts, constructed of reeds and leaves, and erected in jungles and plains. The term *Bádhek* is said to be derived from the *Sanscrit* word, "*Badh*," "destruction."—The following Distich is taken from a *Hindee* Author

"Hit anhit sab hot hyn, Tulsí dúr din pae,
Badheo, Badhek mirg bán te rudhír ké dét butae."

Which may be rendered—

O Tulsí, friends become enemies in the days of misfortune; even as the blood of the stricken deer serves as a guide to the Huntsman (destroyer).

The *Badheks* of *Aly Gher* and the *Shígal Khors* of *Goracpúr* are out-casts of *Mussulman* as well as *Hindu* tribes; the majority however are *Rajpúts*. The records of this office shew a subdivision of classes amongst the *Badheks*, as the *Súdnkí*, *Dúdhadhal*, *Jarun*, *Danpi*, *Thipti*, *Badharah*, *Powar* and *Chowan*, the two last of which are also the distinguishing names of *Rajput* tribes.

The *Badheks* are divided into separate gangs, each consisting of from thirty to an hundred followers, headed by a jummadar; and these gangs occasionally unite for the purpose of carrying on their depredations with greater certainty of success and dispatch. They are commonly protected by zemindars, who support their families during their absence, and assist them when they are apprehended and get into trouble; becoming security to the Police for their future good behaviour, and employing them ostensibly as ryots; but, in fact, harboring and encouraging them in their predatory habits, for the sake of the propor-

tion of plunder, which they invariably receive. They are alſo frequently ſupported by petty Mahajuns, who advance them money at an exorbitant intereſt.

Some of the *Badheks* ſhare ſuch booty as they obtain; others receive a monthly ſtipend of two or three rupees, from their jummadars, who alſo feed and maintain them at a conſiderable expenſe, ſupplying them with ſpirituous liquors, of which they drink inordinately. The jummadars have generally conſiderable ſums of money at their command, either for immediate expenditure, or for obtaining their releaſe by bribery, when apprehended.

Formerly numbers of *Badheks* infeſted different parts of the Diſtricts of *Alygher*, *Etawah*, *Furruckabad* and *Agra*. At preſent thoſe reſiding in the Company's Weſtern Provinces are ſettled on the eſtates of the Chieftains of *Moorſan*, *Hatras*, &c. in *Alygher*, and ſome few in the diſtrict of *Agra*. The reſt are eſtabliſhed in great numbers in pergunnahs *Atreula*, *Balrampur* and *Baraich*, in the North Eaſt quarter of the territory of the Nawab Vizier, and alſo in the vicinity of *Cohad*, *Gwalior*, *Bhertpur*, and the country to the weſtward of *Dehli*.—The gangs generally make excurſions once a year, in the proſecution of which they journey ſeveral hundred miles.—Thoſe in *Alygher* have been known to range to *Saharanpur*, *Haridwar*, *Lucnow*, *Allahabad*, *Benares* and *Jaypur*; and thoſe in *Baraich* to *Choprah* in the diſtrict of *Saran*, to *Hazari Bagh* in *Rungher*, and to *Allahabad*. On ſome occaſions they travel ſeparately, and meet at a given ſpot, or they follow one another in detached parties, in which caſe, they faſten ſhreds of cloth to trees, or pile up mounds of earth or dung, as marks to guide thoſe of their brethren who follow their footſteps.—They travel not unfrequently, diſguiſed as fakeers or Pilgrims, with the water of the *Ganges*, carrying in their *kawers*, or caſkets, heads of ſpears to arm them-

ſelves! and food for their ſubſiſtence. At other times their *jamâdârs* journey through the country as merchants; accompanied by their gangs, and women as ſervants: with camels, carts, tents and doolies. Previouſly to their commencing theſe expeditions, they ſend out their ſpies, diſguiſed as religious mendicants, commonly as *byrágís*, to obtain intelligence in any town or city where they may determine to proceed. It is the buſineſs of theſe ſpies to gain correct information regarding the hoards of caſh or jewels in the houſes of merchants and others, or reſpecting diſpatches of treaſure. In the principal cities are to be found perſons ſtyling themſelves *jamâdârs*, who ſupply the bankers and merchants with hired peons, for the ſafe-guard of treaſure or merchandize. Some individuals of this deſcription have been obſerved to riſe to great opulence in a ſhort time. In ſeveral confeſſions of *Badheks* apprehended in *Furruckabad*, *Sárun* and other places, it is ſtated that the *Badhek* ſpies collude with thoſe jummadars; and inſtances are mentioned of the *Badheks* having themſelves been hired out by theſe *jamâdârs*; to ſerve as peons for the protection of the treaſure which they intended to plunder. The *ſarráfs* and *mahájans*, whether from falſe œconomy or from careleſſneſs, uſually ſend their money under very inſufficient eſcorts; and it is a common practice to attempt to remit and conceal a diſpatch by ſewing up the money in the clothes of the peons.—When the ſpies have obtained information, they prepare bambus, as ſhafts for ſpears, which they bury under ground with torches for the uſe of the gang.—They endeavor alſo to arrange for the reception of the gang, on their arrival, with ſome zemindar or local reſident, with whom they may have been formerly acquainted; or they ſelect ſome retired jungle or ravine where they may remain concealed till the time of action.—On the arrival of the gang the *jamádár* arranges his plan with the ſpies.—They then quit their place of concealment, dig up the bamboos and torches, and fixing on their ſpear

heads, proceed, as early in the dusk of the evening as possible, that they may have the night before them for retreat.—If a house is to be robbed, they station men to guard all the approaches, whilst they effect the robbery; and they invariably murder or wound all who come in their way.—They are equally sanguinary with the guards escorting treasure; and frequent instances have occurred of sepoys having been surprized and butchered at night.—In the doolies they carry off their wounded, as women, with the purdahs down; and as in some of these robberies, *hajáms* or village barber surgeons have been apprehended with the gangs, it is probable that these persons accompany to dress their wounds—Immediately the robbery is effected, they travel the whole of the night, in the direction of their homes, with great rapidity; and divide their booty on the following day, at the first favorable spot; when they separate and return to their places of abode by different routes.

The class of *Shighál Khors*, called *Kunjárs*, are said to have formerly been very notorious as dacoits.—There are however, very few of this class remaining in the western provinces, and those, for the most part, earn a livelihood by the manufacture of cord, baskets and by cutting wood, &c. &c. The *Bawría* and *Harbúra* classes of *Shighál Khors* are particularly squalid, and scarcely human in their appearance. The greater part of them have for time to time, been expelled from the Company's territories, but there are still many remaining; and numbers frequently make temporary incursions from the Mahratta States. These are the men who follow camps, and are particularly expert at cutting into, and stealing from tents. They are not so notorious as gang robbers, as famed for their skill as thieves and cut-purses in passing in crowds of people, and passing the stolen property from one to another, and practising other similar tricks to prevent detection

The *Gidias* are similar in their habits to the two classes last mentioned, and are likewise famed for imitating the noise of animals, when they approach to rob, and for disguising themselves in skins to avoid detection.

Of these classes, the *Badheks* are by far the most numerous and destructive to the peace of the country; and the circumstances under which they rob, combined with the precautions which they take, by giving two or three names to each individual, and using a cant peculiar to themselves, render it extremely difficult to bring them to justice.

Much scepticism still prevails regarding the existence of any distinct class of people who are designated *T'hegs*. Persons have been apprehended, tried and convicted, for highway robbery and murder, under circumstances similar to those which distinguish the crimes of this description ascribed to the *T'hegs*; but no instance has come to my knowledge of any individual having been convicted of highway robbery and murder, against whom it has been established that he was a professed *T'heg*, who earned a subsistence by the commission of this crime. The result of such enquiries as I have made upon this subject, leaves, however, little room for doubt, that there are at present persons residing in the Company's territories who practice this species of robbery as a profession; various confessions in this office shew, that regular societies of these men have had existence, communicating together and making, at stated periods, a division of their spoil.

The term "*T'heg*" is usually applied, in the western provinces, to persons who rob and murder travellers on the highways, either by poison, or the application of the cord or knife.—The literal meaning however, in its common acceptation, as given in the familiar proverb, is "villain," "rascal," "knave," &c. which also is the signification appli-

ed to the term in GILCHRIST's Dictionary.—" *Bhágalpur ca Bhagália, Cahalgeng ca T'heg, Patna ca Dewália, tinon nám zad:*" or, " the *Bhaugulpur* Cheats, the *Cahalgeng* Knaves, and the *Patna* Swindlers, are notorious." They are known also by different appellations in other parts of *India*, as would appear from the following extract from a work recently published.

FORBES'S ORIENTAL MEMOIRS.

" SARENGPUR is famous for a a manufactory of muslins for turbans and other cottons, which are cheaper than any we have met with. A *jat'hera* or religious fair, is occasionally kept here, at which our fellow traveller, SIAD MAHOMMED, a particular friend of SIR CHARLES MALLET's, was present on his last journey to *Delhi*; when several men were taken up for a most cruel method of robbery and murder, practised on travellers by a tribe called *P'hánsigárs*, or stranglers, who join passengers frequenting the fair in bye-roads, or at other seasons, convenient for their purpose. Under the pretence of travelling the same way, they enter into conversation with the strangers, share their sweetmeats, and pay them other little attentions, until an opportunity offers of suddenly throwing a rope round their necks, with a slip knot, by which they dexterously contrive to strangle them on the spot."

IN the part of *India* to which the present report relates, there would appear to be five distinct classes of robbers of this description, who rob and murder on the highways.

1st Class.—THE high roads leading through *Etawah*, [illegible], and *Furrackabad* are, for the most part, the scenes of the atrocities committed by this class. To so great an extent did this crime prevail in former year, that during 1808 and 1809, not less than 67 bodies were taken

out of wells in the ſingle diſtrict of *Etawah*. The gangs compoſing this claſs were eſtabliſhed and foſtered in the eſtates of the Chieftains HI'RA SINH, BHAGWANT SINH, and THACU'R DAYARA'M in *Aly Gher*, and of HIMMET SINH, the former Raja of *Eta* in the diſtrict of *Etawah*, and ſome detached parties alſo reſided in different parts of the three diſtricts above named. In 1812, a liſt of 63 perſons and ſeveral ſirdars called *jamâdârs*, compoſing theſe gangs, was given into this office by perſons who were induced to deliver themſelves up to Colonel GARDNER, under the hope of pardon. They were all *Muſſelmans* and chiefly of the *Mewâti* tribe. By the confeſſions made by the members of theſe gangs, they appear to have carried on their malpractices in ſmall parties, aſſuming various diſguiſes, reſorting to the *Serais*, and accompanying travellers under ſpecious pretences, to have watched their opportunity, and to have deſtroyed their victims in retired places commonly by ſtrangulation, the knife being uſed alſo, to ſecure complete deſtruction, and the bodies being uſually thrown into wells or nullahs. Deleterious drugs are ſaid to be uſed only by novices in the buſineſs, the more experienced *T'hegs* truſting rather to the certain effects of the knife or cord, than to the doubtful operation of poiſon. Theſe murders are moſt frequent in the hot winds, at which ſeaſon travellers are induced to ſtart on their journey before day light to avoid the heat.

2d Claſs.—THIS claſs conſiſts excluſively of *Hindus*, and chiefly of the *Lodeh* tribe.—They are ſtated to paſs themſelves on travellers as *brahmins* and *cayets*, and are reported to be much more numerous than the 1ſt claſs.—The ſcene of their depredations has been, for the moſt part, on the confines of *Etawah*, and the Weſtern thannahs of the *Cánpur* diſtrict, and they are ſtated to be oſtenſibly engaged in cultivating ſmall ſpots of land, though in fact ſupported by the more la-

cr ative profeſſion of *T'heggy*. The murders committed by theſe people are effected by means ſimilar to thoſe practiſed by the 1ſt claſs.

3d Claſs.—This claſs was formerly ſettled in the pergunnahs of *Sindouſe* and *Perhura*, from whence they were expelled, and have ſince taken up their reſidence in *Mahratta* villages, on the confines of our territory, where the *aumils* of the native Governments are ſaid to derive a revenue from their depredations. From the examinations, it would appear, that theſe *T'hegs* are *Muſſelmans* and *Hindus* of various tribes. The murders committed by theſe gangs appear to be perpetrated more openly than thoſe committed by the firſt two claſſes; whole parties of travellers being deſtroyed together, and the bodies of theſe victims being frequently found unburied on the plains. The depradations of this claſs are ſaid to have formerly extended over different parts of the *Doab*, but latterly, to have been directed to the country near *Gwalior* and to the diſtrict of *Bundelcand*. It does not appear that the crime of murder by *T'hegs* was known in the diſtrict of *Bundelcand* prior to 1812, but, in conſequence of the diſperſion of the *Sindouſe T'hegs*, no leſs than 19 inſtances of the offence were aſcertained in 1813, in which 35 bodies were found with marks of the knife or cord. Very conſiderable gangs of theſe people are ſaid to be at preſent collected in the *Mahratta* ſtates. Mr. Wauchope, on the 21ſt inſtant, writes—"But a few weeks have elapſed ſince a party of 42 "travellers (men, women and children,) were every one ſtrangled by a "large body of *T'hegs*. The travellers were coming from *Jebbelpur* "towards *Purna*, and the murders took place about the frontier be- "tween the *Nagpur* and *Purna* country. Four of the miſcre nts were "ſeized by an officer of the *Purna* Chief, &c. &c."

It would appear from examinations in this office, that the puniſh- ment for this offence in ſome of the *Mahratta* ſtates, is by impaling

the criminal alive in a pillar conſtructed of maſonry. The joint magiſtrate of *Etawah* writes, that a gang of *T'hegs*, ſeized not long ſince by the Chieftain MÍR KHAN, were ſubjected to amputation of each hand, and to the loſs of their noſes.

4th Claſs.—SEVERAL inſtances of murder on the highways in the diſtricts of *Allahabad*, *Ghazipur*, and *Juanpur*, will be obſerved in the detailed reports for the laſt year, ſaid to have been perpetrated by perſons aſſuming the garb of *bairagis*, who join travellers at *mat'hs* and accompany them on the road, take an opportunity of mixing the ſeeds of the *Datura* or other narcotic plant, with the hooka or food of the traveller, and plunder him when ſtupified or killed by the effects of the doſe. Theſe murders are not, I apprehend, committed by the perſons termed *T'hegs*—as poiſoning would appear to be the only means of deſtruction uſed by theſe robbers. At the ſame time, as they have prevailed for ſome years, particularly in the diſtrict of *Juanpur*, and the circumſtances attending each caſe are nearly alike, there ſeems reaſon to believe, that ſome aſſociation, ſimilar to that of the *T'hegs* of the *Doab*, is eſtabliſhed in *Juanpur* and its vicinity. Pilgrims proceeding from the weſt and north weſt to *Gáya*, or to *Jagannath* in *Cuttack*, take *Benares* in their way, and paſs through the diſtrict of *Juanpur*. In like manner pilgrims proceeding from the lower provinces, paſs through *Juanpur*, in their way to *Haridwar*, or to *Mathura* and *Bindrabun*. The circumſtances of various roads meeting in this diſtrict, combined with the facilities afforded for eſcape by the proximity of the country of the Nawab Vizier, are probably the cauſes why this offence is more prevalent in *Juanpur* than elſewhere.

5th Claſs.—TRAVELLERS have been frequently found murdered in that part of the country placed under the joint magiſtrate ſtationed at *Ghazipur*.—The bodies have commonly been diſcovered buried, and

the ſame offence can be traced to the eaſtward, through the diſtricts of *Saren* and *Tirhut*. In the detailed report on the ſtate of the police, during the laſt year, in the juriſdiction of the joint magiſtrate of *Ghazipur*, a caſe will be found ſtated, in which it appeared from the magiſtrate's enquiries, that a fraternity of *goſains* had long been eſtabliſhed in that quarter, who were ſaid to entice travellers to ſojourn at their *math*, particularly ſepoys, and to murder them. It is not ſtated what means of deſtruction are uſed by theſe people; but in the examinations taken before Mr. CRACROFT, the zemindars would appear to be concerned with the *goſains* in theſe nefarious practices; and it is ſtated by a witneſs, that numbers of travellers have, for years, been made away with, in this quarter. The eſtabliſhment of chokies, on the highways principally infeſted by theſe miſcreants, and the employment of the village watch in aid of theſe chokies, are, in every reſpect, the moſt certain and efficient arrangements which can be deviſed for the ſuppreſſion of this crime.

MEMOIR

RELATIVE TO A SURVEY OF KEMAON,

With some Account of the Principles, upon which it has been conducted.

By Captain WEBB,

Communicated by the Most Noble the President.

THE progreſs made in the ſurvey of Kemaon induces me to ſubmit an abſtract of the reſults before His Excellency the Commander in Chief, prefaced by a ſhort memoir, not merely to exhibit, what has been done, but with a view to obtain inſtructions, as to the degree of minuteneſs, with which it may be deemed expedient, that the ſurvey in queſtion ſhould be made up.

The number of places, whoſe latitudes, longitudes, and elevations, are included in the annexed catalogue, is conſiderably greater, than that "of places on, and near the *Ganges* river, by Mr. R. Burrow," which latter forms the baſis, on which the whole map of this ſide of *India* has been made to reſt.

If it is not required, that the map of Kemaon ſhould be more detailed, than thoſe of other diſtricts under this Preſidency, it may be ſufficient to fill up the work by routes and information: the preſent liſt of elevations may alone, be ſufficient to convey a general idea of the phyſical aſpect of the country.

But as great attention has been attracted to surveys of this nature, since M. Humboldt's account of *New Spain* has been published, and from other considerations, it is probable, that the work will be thought incomplete, if not accompanied by vertical sections. Hitherto the want of barometers, none having yet reached me in serviceable condition, has prevented my attempting a continued section, which could scarcely be effected by geometrical methods only, as no continued lines of stations could be selected, the distances of which can be determined with sufficient accuracy for this purpose.

It might also be desirable, that some approach to a physical map should be had, with a view to facilitate geological and mineralogical researches, which may by possibility, lead to important consequences. It cannot be doubted, that the mountain districts contain the precious metals, from the well known fact, that the lands of almost every mountain stream are assiduously washed for gold at the points, where their rapidity diminishes The tribe of people, who follow this avocation, are denominated *Boksa*, and their employment is by general report attended with ample profit. The gold dust supplied by the rivers of *Africa*, has long made an opinion current in *Europe*, that some lofty central land exists, which may rival *South America* in its mines of the precious metals—and the same speculation seems no less applicable to the mountains of central *Asia*.

I have it also in view to point out a service of great practical utility, which may be derived to geography from a knowledge of the true position and elevation, of several snowy peaks in the *Himálaya* chain, of which my survey already includes upwards of *thirty*, and most of them are visible from the plains.

With scarcely an exception, surveys in *Bengal* have been made by the compass and perambulator only, and those who have had much

experience in measurements of this description, are well aware, that five miles in an hundred is not an impossible error.

The known positions of snowy peaks afford a ready mode for determining the true geographical place of any station, from whence they are visible; and may therefore be applied to the correction of maps compiled from route surveys of the description just named. It may be well to detail the several cases, in which they may be so applied, and I have appended to this memoir examples of most of them, from which a tolerably correct idea may be formed, of the degree of accuracy, which may be expected to attend the results.

CASE 1st.

Three snowy peaks, the geographical positions of which are known, being visible from any place or station—and the horizontal angles they subtend at that station being observed—the distance of the station from each peak, together with its latitude and longitude, become known also.

CASE 2d.

The latitude of a station being observed, and also the true azimuth of a single known peak—the distance between the peak and the station, and the longitude of the latter, become known also.

CASE 3d.

The angle of elevation of any peak, the heighth and position of which are known, being observed, and the heighth of the station being also known—these data are competent to give the distance between the peak and the station; and if the azimuth of the peak be observed, the latitude and longitude of the place of observation become known also. This case comprises the method adverted to by M. Humboldt in his "Geographical Essay," under the denomination of "Vertical Bases," and which he appears to have adopted very extensively. The survey of a mountain province may thus be accomplished by aid of ba-

rometrical obſervations only, and with extreme accuracy, if the ſtations be not very remote from each other, and are ſo choſen, that their relative difference of elevation ſhall be conſiderable.

CASE 4TH.

THE diſtance and heighth of a known peak, together with its obſerved angle of elevation, give the abſolute heighth of the ſtation of obſervation—or, if this be known, the prevailing degree of refraction may be obtained: which latter it may ſometimes be important to know; far to the weſtward for inſtance, where the ſurface of the country undulates conſiderably, or within the mountains.

CASE 5TH.

AS, by ſome of the foregoing, the true diſtance, and relative poſition of two or more ſtations on the plains of *India*, may be correctly found, it follows, that the true poſitions of ſnowy peaks, not at preſent known, as well as their altitude, may be found, and that ſuch peaks will again enable an obſerver to determine the poſition of any number of ſtations on the plain, or within the mountains, from whence they may be viſible.

IT appears, therefore, that the poſitions of ſnowy peaks, already obtained by my ſurvey, are amply ſufficient to correct the geography of a vaſt belt of country: the breadth of which, in a ſoutherly direction from the *Himálaya* range, averages from one hundred to one hundred and thirty miles, and in length ſomewhat exceeds that of the range itſelf.

THE general direction of the ſnowy chain is from W. N. W. to E. S. E. nearly, to which of courſe the belt is parallel, and if from ſuch a line even perambulator routes were ſurveyed in a ſoutherly direction, ſo as to make but ſmall angles with the meridian, the error in mea-

ſurement would not ſenſibly vitiate the longitude of the place come to, which is the element moſt difficult to obtain. That error would affect the latitude almoſt excluſively, and every tyro in practical aſtronomy can correct the latitude by celeſtial obſervation to within a few fathoms of the truth; and thus it appears, that the limits of geographical correction, for which a means is offered by a knowledge of the poſitions of peaks in the *Himálaya* chain, may be made to extend far beyond the points, at which the peaks themſelves ceaſe to be viſible.

Principles upon which the Survey of Kemaon has been conducted.

THE baſe is a line, nearly in the direction of the meridian. The latitude of the ſtation, at either extremity, having been carefully obſerved with a circular inſtrument, and the angle of an azimuth made by one of them with a meridian paſſing through the other, aſtronomically determined, the length of the baſe was calculated with thoſe data. The value of the meridional degree is aſſumed to be 60,600 fathoms.

FROM the baſe ſo obtained, triangles were extended in the uſual manner, the three angles being obſerved in all practicable caſes. The ſides of theſe were next computed in order, by plane trigonometry, the inſtrument made uſe of being divided only to 20 of a degree.

THE latitudes of the ſeveral ſtations were now calculated, the angle of azimuth being in all caſes either referred to the orginal baſe, or aſtronomically computed. In every inſtance of trial, the latitude computed from the ſurvey agreed with celeſtial obſervation, ſo nearly, as to leave it doubtful, which might be in error.

But it was desirable to have a station of verification, if I may so term it, as far south as possible, and I selected *Pilibhit* for this purpose. The geographical position of the great mosque at that place had been given by Mr. Burrow in this catalogue, and I purposed adopting it, as the first meridian of my survey; by which means, my map would be immediately connected with that of *Rohilkhand*, and I reserved the verifying of the absolute longitude of *Pilibhit*, till leisure and opportunity should permit me to make a series of observations, correspondent with others at the *Madras* Observatory for that purpose.

The snowy peaks, Nos. XIII, XIX, and XXV, are distinctly visible from a grove, near the town, which became my station, and I was enabled to connect it with a minaret of the great mosque by a single triangle, one side of which was measured. The true azimuth of the minaret, and the distance so obtained, gave its difference of latitude from my station 0′ 51″.4 southerly. Also the latitudes of the snowy peaks, as fixed by my survey, were respectively,

XIII =	30°	15′	36″.1	N.
XIX =	30	12	18.1	N.
XXV =	29	52	45.7	N.

The horizontal angles, subtended by the abovementioned peaks, were observed, and their several azimuths astronomically computed.

Assuming the position of the snowy peaks to have been truly given by my survey, I computed, (as in Case 1st,) their respective distances from my station, which came out by the calculation as under;

XIII = 97291 fathoms. XIX = 98340 fathoms. XXV = 9 03) fathoms.

These distances, computed with the true angles of azimuth give their differences of latitude, and consequently the latitudes of my station, and that of the mosque as follows:

Latitude of snowy peaks	XIII = 30 15 36,1	XIX = 30 12 15,1	XXV = 29 52 45,7
Differences of latitude	.... 1 36. 19,8	1 32 58,2	1 13 28,2
Latitude of station	.... 28 39 16,3	28 39 16,9	28 39 17,5
Mosque south	.... 0 0 51,6	0 0 51,6	0 0 51,4
Latitude of mosque	.... 28 38 24 9	28 38 25,5	28 38 26.1

The latitude of the mosque, by Mr. Bunnow's observation, is 28° 38' 20" N.

This very exact result may be admitted, as a proof of the correctness of the base, the smallest error in which would have been sensibly felt, when its operation was extended to distances approaching to ten times its own length, or nearly one hundred thousand fathoms.

I next computed the differences of longitude of all the stations from *Pilibhit*, using, what is generally termed, a table of meridional parts for that purpose. It was not till a month ago, that I was much gratified by finding, that M. Humboldt had adopted the same method in his survey of *Mexico*, and that he had even used the same table, that given by Mendoza de Rios.

Being now assured, that the distances given by my survey were trustworthy, it became necessary to determine the heights of the several stations above *Rohilkhand*, and approximately above the sea; but the weather became hazy at *Pilibhit*, and it was not till my arrival at *Cásipur*, that a favorable opportunity for this purpose presented itself.

The snowy peaks, Nos. XI, XII, XIII, XIV, are distinctly visible from *Cásipur*; and their respective heights above that place, and also above *Cáli Math*, a high mountain near *Almora*, were calculated from their observed angles of elevation at each. The refraction being allowed at $\frac{1}{13}$ of the intercepted arch, though it is not probable, that exactly the same degree prevailed at the mountain station, and that on the plain, gave results as under:

		XI.	XII.	XIII.	XIV.
Above Cásípur	....	Feet 20019 6	22724,4	21681,0	24094 2
Above Cáli Mat'h	....	Dit o 14262.2	16848 6	15895,8	19252,2
Cáli Mat'h above Cásípur		Ditto 5750,4	5878,8	5788.2	5842,0

The mean of the four give the heighth of Cáli Mat'h above Cásípur .... 5767 Feet
Assumed heighth of Cásípur above the sea .... 650 Ditto

Approximate heighth of Cáli Mat'h above the sea 6417

THE preceding differences, ſhould, of courſe, be exactly equal to each other, but the uncertainty with reſpect to the refraction due, together with the poſſible errors of obſervation, at both ſtations, are more than ſufficient to account for the existing diſcrepancy. The mean of the whole is taken as the heighth of *Cáli Mat'h* above the plains of *Rohit-khand*, and *Cásípur* is eſtimated to be 650 feet above the ſea, which cannot be very wide of the truth.

ALL the heighths of places within the hills, have been referred to this altitude of *Cáli Mat'h*, either directly, or with intermediate ſtations; alſo $\frac{1}{7.8}$ of the intercepted arch, has been uniformly allowed for the effect of refraction, in computing the altitude of ſnowy peaks, and $\frac{1}{14}$ of the ſame arch, for all points below the inferior limit of congelation.

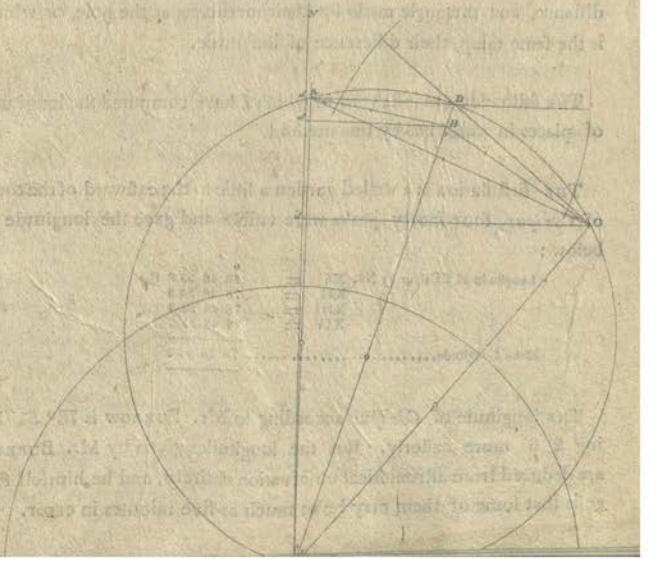
IT is at preſent my opinion, that both theſe quantities exceed the medium effect of refraction, under the circumſtances, in which the obſervations are made, and though it is not neceſſary to exaggerate heighths, already enormous, I am inclined to believe, that all the elevations err a little in defect, in conſequence of having uſed them.

IT remains to ſhew examples of the caſes I have ſuggeſted, in which the known poſitions of ſnowy peaks may be uſefully applied to the connection of geographical maps, conſtructed from perambulator meaſurements.

CASE 1st.

The computations at *Pilibhit*, an abſtract of which I have already given, furniſh an example of this kind; and it has been ſhown, that the latitudes of the place of obſervation as obtained ſeverally, from three very diſtant ſnowy peaks, do not differ from each other more than a ſingle ſecond. It may therefore be preſumed, that the diſtances are equally correct, or that the error upon any one of them does not exceed twenty fathoms.

On account of its great ſimplicity, I ſubjoin a graphical ſolution of the problem in that particular inſtance.



In the preceding diagram the ſtation near *Pilibhit* is repreſented by P. *A, B, C*, are the ſnowy peaks, Nos. XIII, XIX, XXV, reſpectively; *PA, PB, PC*, their diſtances from the ſtation; *Pd, Pd', Pd''* their differences of latitude. *PN* is a meridian paſſing through the ſtation. The things known are marked with a line (') the things required with a cypher (o).

CASE 2d

Is that moſt likely to occur in practice, as it affords a means of computing the longitude of the ſtation from obſervations of a ſingle known peak.

It ſuppoſes to be known, the co-latitude of the peak, the co-latitude of the ſtation, and the angle of poſition at the latter; to find the arch of diſtance, and the angle made by their meridians at the pole, or which is the ſame thing, their difference of longitude.

The following are inſtances, in which I have computed the longitude of places in *Rohilcund* by this method.

The firſt ſtation is a wa'led garden a little to the eaſtward of the town of *Cás'ipur*, four ſnowy peaks were viſible and gave the longitude as below:

Longitude of Cá'ipur by No. XI	=	78° 48′ 53″,8	E.
XII	=	78 48 54,8	
XIII	=	78 48 52,3	
XIV	=	78 48 55,5	
Mean Longitude.....		78 48 54 1	

The longitude of *Cás'ipur* according to Mr. Burrow is 78° 51′ being 2′ 6″ more eaſterly. But the longitudes given by Mr. Burrow are deduced from aſtronimical obſervation entirely, and he himſelf ſuggeſts that ſome of them may be as much as five minutes in error.

THE next ſtation is the village *Chemrowa*, in the *Rampur* jaghir.

Longitude of Chemrowa, deduced from	No. XII,	=	78° 58′ 13″,4
	No. XV,	=	78 58 8,3
Mean Longitude,			78 58 10,8

THE third and laſt example was obtained at the fort of *Afzelgerh*.

Longitude of Afzelgerh by	No. VI,	=	78° 31′ 55″,8
	VIII,	=	78 32 17,7
	XII,	=	78 32 2,7
	XIII,	=	78 32 6,7
	XV,	=	78 32 25,8
Mean Longitude,			78 32 9,6

THE ſnowy peaks, Nos. VI and VIII, are compriſed in the cluſter ſuppoſed to be *Badarinâth*, and by a reference to the conditions of the triangle, which aſſigns their poſition, they will be found ſo unfavorable as not to promiſe a reſult of *great exactness*.

IT will alſo be obſerved, that the angles made by the azimuths of the eaſtern peaks with the meridian are very conſiderable, and that the ſmalleſt error in the aſſumed latitude or azimuth, will produce a very ſenſible effect, under theſe circumſtances.

THE longitude of *Afzelgerh* by Mr. BURROW is 78° 33′ 40″, or eaſterly of mine 1′ 33″.

THE difference of longitude between *Pilibhit* and *Cásipu*, is by Mr. BURROW 2′ 6″ *leſs* than by my ſurvey. And the difference of longitude between *Cásipur* and *Afzelgerh* is 0′ 35″ *greater*, than by me, although his ſtation at the former place, was to the *weſtward* of mine.

AND it is evident, that though the errors of aſtronomical obſervations may be plus or minus, *indiſcriminately*, ſuch cannot be the caſe with

trigonometrical deductions from fixed points. I have uſed the ſame peak No. XII and XIII both at *Cáſipur* and *Aſzelgerh*.

CASES 3 and 4.

I HAVE already noticed that to attain *great* accuracy by theſe methods, the difference of heighth of the ſtations ſhould be conſiderable, and the diſtance not very great; eſpecially when the angle of elevation or depreſſion, can be obſerved at one ſtation only. Not being provided with barometers, I have no ſuch example to offer, as I could wiſh, or as the methods themſelves are fully ſufficient to afford.

WHEN the arch of diſtance is very great, and the angle of elevation extremely ſmall, the varieties to which the refractive ſtate of the atmoſphere is ſubject, will alone occaſion diſcrepancies of vaſt amount. That this is the caſe, will be clearly ſeen by the following approximations, in which I have ſuppoſed the ſtations to be preciſely on the ſame level with *Cáſipur*, which is not of courſe, ſtrictly true.

STATION AFZELGERH, EXAMPLE I.

Refraction.	°	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$
Diſtance No. XII. by caſe 3d, ...	77810	80266	79124	79018
True Diſtance of No. XII.	78843	78843	78843	78843
Errors.	−1033	+1423	+581	+175

Refraction	'	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$
Diſtance No. XIII. by caſe 3d.	79779	82316	81403	80926
True Diſtance No. XIII.	80895	80895	80895	80895
Errors.	−1116	+1423	+508	+31

Refraction.	°	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$
Diſtance No. XV. by caſe 3d.	87107	90558	89371	88812
True Diſtance No. XV.	89018	89018	89018	89018
Errors.	−1911	+1540	+353	−206

STATION CHAMROWA, EXAMPLE II.

Refraction.	°	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$	$\frac{1}{14}$	$\frac{1}{15}$
Distance No. XII. by Case 3d.	94679	97397	97979	98252	98485	98831
True Distance of No. XII.	98578	98578	98578	98578	98578	98578
Errors.....	−3899	−1181	−599	−326	−93	+253

The true diſtances of the ſnowy peaks, which have been uſed as a ſtandard of compariſon in the preceding examples, were derived by Caſe 2d.

It ſeems reaſonable to infer, that the refractive ſtate of the atmoſphere demanded an allowance, in the firſt example, equal to about $\frac{1}{14}$ of the intercepted arch, and in the ſecond to $\frac{1}{13}$ nearly.

Had the mean ſtate of refraction, which I aſſume to be $\frac{1}{11}$ for ſnowy peaks, been uſed in theſe inſtances by a traveller, deſirous to know his place in the map, his concluſion would have been erroneous by about $\frac{1}{2}$ a mile, at *Afzelgerh*, and by ſomething leſs than $1\frac{1}{2}$ mile at *Chamrowa*. He might ſtill, however, conſole himſelf with reflecting, that, even were it poſſible to find a level road to the *Himálaya*, a derambulator ſurveyor could not meaſure the diſtance, after many day's labor, with any chance of obtaining it ſo correctly, as it had been thus acquired by an obſervation, which was made and computed in twenty minutes.

I cannot at preſent offer an example of the 5th Caſe, as no ſnowy peak is viſible from any part of *Rohilcund*, where I have been, the poſition of which is not already eſtabliſhed by my ſurvey of *Kamaon*.

Catalogue of Places, with their respective Latitudes, Longitudes, and Elevation above the Sea, as derived from a survey of Kemaon.

By Captain W. S. Webb, Surveyor.

No.	Names of Places.	Latitude.	Longitudes.	Elevations.
				Feet.
1	Pilibhít, (the Great Mosque).....	28 38 20 N.	79 41 45 E	——
	Station (A) (in Grove near ditto.)..	28 30 16.9	79 49 [illegible]	——
	Cáli Math, (Gorkha Stockade.) ...	29 38 11.5	79 [illegible]	6417
	Snowy Peak I. (Great Himálaya.)..	30 49 47.2	78 51 19.6	22345
5	.... II.	30 49 4.3	78 52 11.3	22058
	.... III.	30 46 22.3	78 55 16.9	22840
	.... IV.	30 45 46.9	78 58 46.1	21611
	.... V.	30 38 28.9	79 4 49.5	19106
	.... VI.	30 42 22.9	79 6 10.9	22498
10	.... VII.	30 41 57.7	79 7 28.9	22578
	.... VIII.	30 43 40.9	79 8 17	23164
	.... IX.	30 42 4.3	79 15 16.2	21311
	.... X.	30 20 16.9	79 28 0.7	15733
	.... XI.	30 20 6.1	79 33 40.8	20886
15	.... XII.	30 17 59.6	79 37 7.6	23268
	.... XIII.	30 15 36.1	79 42 49.8	22313
	.... XIV.	30 21 51.7	79 48 39.6	23669
	.... XV.	30 16 13.3	79 54 25.7	22419
	.... XVI.	30 12 3.7	80 5 26.6	17994
20	.... XVII.	30 11 14.6	80 7 9.7	19.53
	.... XVIII.	30 14 33.1	80 12 40.5	21430
	.... XIX.	30 12 15.1	80 18 42.6	22635
	.... XX.	30 9 28.3	80 16 44.5	20467
	.... XXI.	30 6 41.5	80 28 51.1	19029
25	.... XXII.	30 6 18.7	80 30 22.8	19497
	.... XXIII.	29 59 33.7	80 44 3.6	22727
	.... XXIV.	29 57 13.3	80 50 23.8	22286
	.... XXV.	29 52 45.7	80 51 36.5	22277
	Snowy Peak XXVI. (Himalaya.)..	29 50 44.5	80 51 31.1	21015
30	.... XXVII.	29 49 42.8	80 54 19.3	21023
	Reoni Temple.	29 39 33.7	79 22 4.2	6926.7
	Nyathana Fort.....	29 47 56.5	79 9 39.8	5786
	Siahi Oak Tree.	29 34 14.5	79 24 4.7	7193.2
	Badhun Dhua Peak.	29 28 33.7	79 13 1.1	8433
35	Dunn Giri Temple.	29 47 21.7	79 17 50.1	7278.2
	Bhateot Peak.	29 49 34.9	79 20 50.4	[illegible] 16
	Ahri Deo Peak.....	29 44 42.7	79 25 8.2	7 [illegible] 0
	Gana Nath Stockade.	29 45 56.5	79 30 29.6	6[illegible]
	Binser Peak.....	29 42 1.9	79 35.42.4	8503.9
40	Shem Deo Temple.	29 36 34.9	79 40 33.9	8558.8
	Fort Moira.....	29 35 7.9	79 29 40.4	771 9
	Mote'hser Peak.....	29 28 12.1	79 20 20.7	6.15 9
	Banlani Peak	29 33 16.8	79 33 24	6 [illegible]
	Shem Deo. (Station.).....	29 36 13.1	79 41 15.9	7 [illegible]
45	Pin Nath Temple.....	29 49 57.1	79 23 19.2	7 [illegible]
	Baghe Ling Temple.....	29 47 30.1	80 2 27.5	77 [illegible]
	Rai Peak..	29 43 21.1	79 51 49.7	6 [illegible]
	Rai (Station.)..	29 43 14.6	79 51 29.3	8168.1
	Dhaj Peak.....	29 28 34.9	80 7 45.1	8 48 6
50	Thaeil Peak.....	29 30 17.9	[illegible]	[illegible]

No.	Names of Places.	Latitudes.	Longitudes.	Elevations.
		° ′ ″ N.	° ′ ″ E.	Feet.
	Heighths above Ascot. (Station.)	29 45 46 3	80 8 56.8	5502.9
	Sítacot Temple.	29 48 28 9	80 5 3	6862.1
	Bárah Bishí Peak.	29 42 49 9	80 4 40 I	7805 4
	Húm Peak.	29 58 35 5	80 6 28.9	9847.4
55	Cut lgé h Fort, ...	29 24 13 9	79 53 38 4	6321.7
	Banc i Peak.	29 20 36.1	80 3 7.3	6061.2
	Bynt'hari Fort. (Dotee.)	29 33 9.7	80 15 58 3	5543.2
	Calí Nágh Peak.	29 51 36.1	79 57 13.4	7298.
	Chirálék'h P. (in Dotee)	29 34 55.9	80 9 6.4	6544.4
60	Roul cot. (Ditto.)	29 33 16.7	80 24 6.3	8291.2
	Go'al Pékh P. (Ditto.)	29 29 1.9	80 14 57	8194.8
	Chaumunh Temple.	29 35 41.8	*79 11 35.9	6355.7
	Gupat Gangá Peak.	29 37 31.9	79 52 57.6	7192.2
	Asú Chúla Temple.	29 37 31.9	80 1 11.4	7034.9
65	Cumbhpúr Temple.	29 38 17.5	79 15 34 4	6306.9
	Cát'h cí Na'o Fort.	29 35 45 7	79 0 32.4	4978.1
	Lobahger'h Fort.	29 58 4 3	79 10 53.3	6357.7
	Ascot Village.	29 45 17.5	80 10 35.9	5016.7
	Chipala Peak. (Bútan.)	29 54 42.1	80 16 52.5	13455.1
70	Rání Shica P. (Dotí.)	29 46 41 5	80 24 1.2	10133.3
	Shica P. (Ditto.)	29 44 34 9	80 21 10.5	9176.3
	Chand Nágh P.	29 37 37.3	80 3 56.9	7078.7
	Mount Lébug (Summit of the Pass (a)	30 19 43 3	80 27 24.9	18870.6
	Goh Village. (Bútan)	30 14 40.5	80 22 45.5	11488.8
75	Edge of the Calí R. below Ascot ...			3273.2
	Deo Dhúa Temple.	29 24 33	79 43 17	6669.6
	Khilpatí Stockade.	29 21 30	80 0 44	6324.8
	Chamáwat Cantonment.	29 19 45	79 56 17	5467.5
	Súí Peak.	29 25 27	79 55 10	5837.8
80	Hawal Bág'h.	29 38 20	79 28 3	3889.
	Sitolí Stockade.	29 36 13	79 29 8	5187.
	Mount Browne.	29 36 44	79 30 46	5705
	St. Mark's Tower.	29 35 40	79 30 28	5404
	Fort Almora.	29 35 30	79 30 0	5337
85	Cutár Mall.	29 37 22	79 27 9	5144
	Simtonea Peak. (Bútan)	29 18 46	80 28 49.9	10662.2
	Jeú í Village. (Ditto,)	29 57 40 1	80 26 24.7	6310
	Snowy Peak ab. Golaghí (Himalaya.)	29 8 19	80 32 38	21150.
	Taugling Ghaí. (Bútan.)	30 1 12	80 27 15	11651.6
90	Runju Village. (Ditto.)	30 57 48	80 25 25	6779
	Saísura Village. (Ditto,)	29 55 32	80 28 45	6211.8
	Cíla, or Sealpunt. (Ditto)	29 56 30	80 25 36.3	5218.6
	Cíla Bridge over the Dhulí R. (Do.)			3811.2
	Confluence of Réla Cher & Calí R. (Ditto)	29 53 56	80 24 0	3721.8
				3924.8
95	Camp below Húma. (Ditto)	29 54 18	80 23 45.8	6564.2
	Júma Village. (Bootan.)	29 52 57	80 23 27	5686.5
	R t'lí (Ditto,)	29 55 27	80 24 15	5931.2
	Shacú í (Ditto,)	29 48 31	80 0 16	4443.2
	Dingal'har, Village	29 47 23	79 56 55	4224 8
00	Thal Debí, Temple.	29 48 11	79 52 52	5128.1
	Khané Village.	29 50 43	79 51 52	5717.4
	Hanú cí Thán. (Temple.)	29 48 10	79 51 45	5703.5
	Odíarí Village.	29 46 12	79 53 53	5375.3
	Dhandulú. Ditto, ...	29 46 43	79 54 32	4341.5
05	Bú óra. Ditto, ...	29 50 31	79 51 52	5730.6
	Loha Thal Ditto, ...	29 50 31	79 53 33	5734.8
	Desaulí Ditto, ...	29 51 30	79 52 0	5618.4
	Saulí Ditto, ...	29 50 50		

No	Names of Places.	Latitudes.	Longitudes.	Elevations.
				Feet.
	Garbia village. (Bútan.)	30 6 55 N.	80 41 32.6 E	10200.2
110	Mt. Namjang. (Himalaya.)	30 2 18.4	80 39 44.6	18398
	Trig. Station near Garbia.	30 6 1	80 39 46	10983.2
	Spar Bridge over Calapaní R. (Bútan.)	30 9 7	80 42 23	12670.4
	Byás Rik'hi P. (Himalaya.)	30 9 28	80 46 2	19857.2
	Maudarin's Camp. (Bútan.)	30 11 19	80 44 18	14433.8
115	Ghatí, or Pass to Factory.	30 11 45	80 48 10	17597.8
	No. 1 of Cúntas. (Himalaya.)	30 13 17	80 45 0	22441.4
	No. 2, (Ditto.)	30 12 47	80 46 8	20991.8
	Kuwa Lekh P. (Bútan.)	30 8 0	80 42 52	15245.4
	Station near confluence of the Calí and Cálapání Rs. (Bootan.)	30 8 16	80 41 31	11341.4
120	Sitbi Lekh P. (Himalaya.)	30 7 98	80 40 16	15811.4
	Bouling village. (Bútan.)	30 5 12	80 26 49	—
	Phakul ditto. (Ditto.)	30 3 21	80 27 17	—
	Cálapání Fountain.	30 10 30	80 43 28	—
	Deodar Ghat. (b)	29 28 2	79 26 40	6273.7
125	Ghagar Ghat. (c)	29 24 25	79 23 3	7696.1
	Lobarcat Steckade.	29 27 45	79 26 7	6732.4
	Surface of the Lake, Bheem Tal. (d)	29 19 18	79 23 53	4271.5
	Kissenpúr (Rohilcund.)	29 12 18	78 48 54.1	—
	Chamrowa. (Ditto.)	28 46 26.9	78 58 10.8	—
130	Afzel Khan's Palace. (Ditto.)	29 23 52	78 32 9.5	—
	APPROXIMATIONS. (e)			
	Taclazot. (Chinese Factory.)	30 12 43	81 2 10	14500
	Lake Mansarovar. (Ditto ditto.)	30 23 7	81 9 10	

(d) *A ch'habútra*, or Sat'hí at the southern extremity of the lake.

REFERENCES.

No. 73, (a.) With extreme difficulty, and I may add, with extreme peril, I was fortunate enough to accompliſh the paſſage of *Lebúg Ghátí*, without accident on the 6th of June 1816.

Nos. 124, 125, (b,) (c.) The new road from *Bamauri* to *Almora*, recently conſtructed at the expence of the Britiſh Government, croſſes both theſe points.

No. 126, (d.) The ſhape of the lake *Bhím Tál* approaches more nearly to a triangle, than to any other regular figure, the length of the longeſt ſide is about a mile, and that of the ſhorteſt five furlongs. Its extent appears to have been much greater at ſome former period; and the diminution it has experienced, is evidently to be attributed to depoſition by the ſtreams flowing into it. There is ſtill depth of water

ſufficient for a firſt rate line of battle ſhip to ride at anchor. Lieut. STEPHEN, who had a ſmall canoe on the lake, ſtruck ſoundings in 64 feet or nearly 11 fathoms, about the central parts, and the banks ſhelve very rapidly.

APPROXIMATION E; the poſition of the paſs leading to *Taclacot* is already given by my ſurvey; the direction of *Taclacot* was pointed to me north 82° eaſt from thence, and its diſtance from the eaſtern deſcent is one day's journey for laden goats; the above bearing, with a horizontal diſtance of eight miles from the ſummit of the paſs, cannot give a very erroneous poſition to *Taclacot*.

THE direction of *Manſarovar* was alſo deſcribed to me by many perſons, who had viſited it to be about north 30° eaſt from *Taclacot* and the diſtance two day's journey, for laden goats, which as the road is level may perhaps be 14 miles.

BY this information I have aſſigned, what I imagine to be the geographical poſition nearly of the monaſtery, mentioned by Mr. MOORCROFT, and which I conclude to be ſituated on the weſtern bank of the lake, but as *Manſarovar* is ſtated to be of an elliptical ſhape, and to have its diameters equal to eleven and ſeven miles reſpectively, it ſeems at leaſt probable that the latitude and longitude, I have given will fall ſomewhere within the limits of the lake itſelf eſpecially if it be remembered, that the place at which my information was obtained, is not ſo much as twenty miles diſtant from *Manſarovar*.

ALL the *Tartars* and *Bhátias* who were with me were of opinion, that the eaſtern deſcent of *Taclacot Ghátí* was not greater than the weſtern, and hence we may conclude that the elevation of the lofty table

land of central *Aſia* is nearly the ſame, as that of the *Deba's* camp. (No. 114,) or 14,500 feet above the level of the ſea.

ALTHOUGH ſeveral of the preceeding latitudes, and longitudes, are inſerted to the tenth part of a ſecond, as given by the calculations, it is by no means intended to convey an idea, that the principles, on which this ſurvey is conducted, can attain to that great degree of exactneſs.

EVERY figure of even the most trivial computation will be found in the field books, which I have tranſmitted to the Surveyor General's Office: in ſo much work, when the ſurvey in the field and all its dependant computations reſt with an individual, a few errors may be excuſed; ſome I have diſcovered and corrected, though none have been pointed out to me, ſome may ſtill remain.

UPON the whole, I flatter myſelf, that in the more eſſential parts, this ſurvey will bear compariſon with any, that have been performed in Bengal, and I can only lament that I have not been able to collect the materials into a map of ſuitable external appearance.

VI.

CEREMONIES

OBSERVED AT THE CORONATION OF A HINDU RAJA,

By Mr. BROWN.

As the obſervance of any public ceremonies amongſt the *Hindu* population of *India* is daily falling into diſuſe, and as they will conſequently be known at no diſtant period from tradition alone, it may perhaps form part of the objects of the Aſiatic Society, to procure ſuch deſcriptions of them as eye-witneſſes of their performances are qualified to contribute, and to preſerve in the tranſactions of the ſociety, ſuch memorials of their paſt exiſtence—with this view I beg leave to offer to the acceptance of the ſociety the following account of the coronation of the Raja of *Colaſtri*, at which I happened to be preſent.

In order fully to comprehend the cauſes that then led to that ceremony, it is neceſſary for me to ſtate the political ſituation of the *Ráj* of *Colaſtri* at that period.

The arms of the *Tartar* conquerors of *India* never penetrated into *Malabar*, the inhabitants of which preſerved their ancient government, religion, and cuſtoms, until the invaſion of Hyder Ally from the neighbouring province of *Canara* about the year 1766, with a numerous army, put an end to the *Hindu* government, by the expulſion of the Rajas and chief men, moſt of whom fled to *Travancore*. As the *Mapilla* chieftain of *Cananore*, Ali Raja, had urged Hyder to, and aſſiſted him in this conqueſt, he, as a reward put him in poſſeſſion of the *Ráj* of

Colaſtri on condition of paying an annual tribute. The government of the country being then transferred from the *Hindus* to fanatical *Muſſelmans* was, during the courſe of 12 years which Ali Raja held it, almoſt completely depopulated; murder and rapine prevailed in every quarter, ſo that no *Hindu* remained in it who had the means of getting to *Travancore*. During this long period, little of the ſtipulated tribute had been paid, and Hyder therefore willingly liſtened to propoſals made to him by one of the princes of the *Colaſtri* family, (who had been protected in the Honorable Company's ſettlement of *Tellichery*) to pay him tribute if reſtored to his country. The negociation was carried on through DOMINGOS RODRIGUES, the Company's linguiſt, a man of great wealth, who becoming ſecurity for the payment of the tribute, the Raja was put in poſſeſſion of the *Ráj*, in 1776-7, with full powers to re-eſtabliſh the ancient government. This was immediately done; the exiles were recalled, and reinſtated in their landed property, but the country from ſo long a courſe of oppreſſion and ſpoliation, afforded ſlender means of realizing the tribute; whilſt the reſidents, under the name of *harcaras*, placed with the Raja to receive the tribute, and to obſerve and report his actions, augmented his diſtreſs by their rapaciouſneſs. The firſt year's tribute was advanced by DOMINGOS RODRIGUES, but ſubſequently the revenues ſtill continued unequal to the demands on them, and therefore, after the country had been reſtored to ſome kind of order, the expedient of crowning the ſenior Raja, for the purpoſe of raiſing money, was reſolved on. It is here neceſſary to explain that the law of ſucceſſion adopted in this family, and indeed in all the Raja families of *Malabar*, is, that the ſenior male, by the female line, ſucceeds to the firſt ſtation of *Colaſtri* Raja, in whoſe name the government is conducted by an acting Raja whom he appoints, and who is in fact the ruler, the other after being crowned, retiring to a certain lot with all the enſigns and exterior marks of dignity, where he paſſes his time in the performance of religious ceremonies. What probably rendered

the adoption of this mode of delegated government neceſſary is, that as the number of princes in the family is generally conſiderable, (the ſons of all the daughters ſucceeding each other according to priority of birth) the ſenior is always far advanced in years and paſt the term of active life, before he comes to that dignity. The ſenior raja, in the preſent inſtance was a very aged man, not leſs, I judged, than 70 years of age. He had hitherto remained in *Travancore*, probably to avoid the expence neceſſary for his eſtabliſhment, but was now brought from theſe, that the finances of the *Rāj* might be recruited with the contributions due, by cuſtom, not only from its own ſubjects but from the other rajas and chieftains connected with it, on the performance of this ceremony; at which alſo attended deputies from the ſettlement of *Mahé* and *Tellicherry*, each preſenting a box containing a certain ſum in gold, in conformity to ancient cuſtom. The *bramins* having fixed on an auſpicious day in the month of December 1778-9 notice of it, and invitations, were ſent far and near, and great preparations were made by the acting raja for the accommodation, and entertainment, of the multitude that were expected to aſſemble from all parts of *Malabar* and the countries of *Cochin*, *Travancore* and *Pālghat*.

The place which immemorial cuſtom had preſcribed for the performance of this ceremony was a fort, named *Maday*, ſituated between the rivers of *Valliapatam* and *Cavay*, in an open ſpot, and more ſpacious than *Malabar* forts generally are. Here on an elevated ſpot under a canopy, a kind of throne, but not higher than a common chair, was placed. About one o'clock p. m. the raja was brought in a covered palankeen, attended by many *bramins*, to this chair, and ſeated in it, but concealed from the ſpectators by *perdas* held up before him, whilſt the people were made to fall back to a diſtance of 20 to 30 yards in front, and *bramins* were there ſtationed to prevent any perſon going beyond thoſe

limits. The concourſe of people aſſembled was very great. Into the fort the chief people only had been admitted; the multitude were without the walls in vaſt numbers, but from the elevation of the ſpot on which the throne was placed moſt of them could ſee it.

The propitious moment being arrived, the *pardas* were withdrawn and the raja expoſed to view with the crown on his head. Various rites were then performed by the *bramins*, whilſt others recited invocations and chaunted ſtanzas appropriate to the occaſion. This continued for about half an hour, when the chief *bramin*, or prieſt of the Raj advanced, having a flat ſilver diſh in his left hand, containing a little fine unboiled rice. He approached ſo cloſe to the raja as to be able to reach the crown with his hand, ſtopped and recited a prayer or invocation. He then took a little of the rice in his right hand and dropped it on the crown. This he repeated three times letting the rice fall ſlowly, whilſt he at ſame time continued to proclaim in a very loud voice the new titles of the raja, with invocations or prayers compoſed no doubt for the auguſt ceremony.

The ſilence of the multitude without, as well as within the fort, during all this was admirable. The awe and reverence with which they beheld the rites and liſtened to the *bramins* was ſo great, that not a breath was to be heard whilſt they continued, ſo that the voices of the *bramins* were diſtinctly heard out of the fort; but the moment the adoration, which was that when the laſt rite with the rice was completed, was no ſooner come, than a ſimultaneous ſhout burſt from the whole, ſo loud and ſudden and ſo ſtriking to me, from its being totally unexpected, that it ſeemed the ſhout of Milton's pandæmonium realized.

The adoration at the ſame time began, and continued as long as the Raja remained expoſed, which was above an hour, during which he

offerings were presented and received by the attendants. During the same time gifts of cloths and money were distributed amongst the *bramins* and their women, the number of whom alone was immense, all of that cast of the adjacent countries and many even from *Tanjore* having assembled. For their accomodation also, very extensive wooden buildings had been erected, in which they were feasted with dressed victuals, consisting of rice, dhál, ghee, curries of various vegetables, with papadoms, (fine cakes, made of gram flour, and a fine species of alkali, which gives them an agreeable salt taste and serves the purpose of yeast, making them rise and become very crisp when fried) plantains and other fruits. This entertainment, which was for the *bramins* and their families only, continued three days, twice each day.

THE gestures made use of on this occasion to express their adoration, were sufficiently remarkable to merit a description. The person standing erect lifts his hands to his face and joins them open, the fingers stretched and reaching a little above the eyes; the fingers are then drawn down to the palm, and the hands drawn back from each other to the distance of eight or ten inches, then replaced as before, and the same motions repeated, which when performed by every individual of so great a multitude formed a very singular scene.

THE crown was of gold, but the distance at which I was placed, prevented me from noting any thing but its form, which resembled that of the *Tiara*, worn by the *Roman Pontiffs*, before it was disfigured into a triple crown by the arrogance of BONIFACE and BENEDICT. When we consider with what minuteness the *Hindus* adhere, even in matters of minor importance to the practices of their ancestors, we may conclude that the form of this crown was very ancient, and is therefore worthy of remark as being different from that of any diadem worn by princes either now or at former periods; but that the

cap of ceremony of the high prieſt of the Temple of *Jeruſalem* was not unlike it.

This ceremony on the whole affords two ſubjects worthy of conſideration. Firſt, the rite of ſprinkling rice over the crown, whilſt on the head of the raja, ſo different from any practice in the weſt of modern or ancient times. The rite now in uſe of anointing princes at their coronations is of modern inſtitution, and generally admitted to have been borrowed or imitated from the Jews. Secondly, the circumſtance of its being a ceremony ariſing out of a feudal ſyſtem of government, at which all the vaſſels were obliged to appear, and to contribute to the expence of it, each according to his rank; and that it ſhould have been reſorted to for the purpoſe of filling the raja's coffers in a ſimilar manner to that in which our own princes often rendered the feudal ceremonies ſubſervient to ſimilar purpoſes.

I have the honor to be, Sir,

Your moſt obedient ſervant,

A. BROWN.

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VII.

ANALYSIS OF THE SNAKE-STONE,

BY

J. DAVY, M. D. F. S.

SNAKE-STONES, it is well known in *India*, are ſubſtances employed by the natives as remedies againſt the bite of venomous ſerpents.

THE forms of theſe ſtones and their external characters have already been deſcribed by more than one author, but I am not aware, that any account has been publiſhed, yet, of their chemical nature.

FOR thoſe ſtones which I have examined, I am indebted to the Honorable Sir Alexander JOHNSTONE, Chief Juſtice of *Ceylon*. They were of three different kinds.

THE firſt kind were ſmall bodies, round or oval, nearly white towards their circumference and black or brown at their centre; they were poliſhed, poſſeſſed a ſlight degree of luſtre and had a pretty appearance, in conſequence of which and their ſuppoſed virtues, they are occaſionally ſet and worn as neck-ornaments; they were of moderate hardneſs, eaſily cut by the knife, but not ſcratched by the nail; when breathed on they emitted an earthy ſmell like clay, and when applied to the tongue or any moiſt ſurface, they firmly adhered to it.

BEFORE the blow-pipe they gradually became perfectly white and loſt a little of their ſubſtance, yet they emitted no fume or odour or

flame. Put into dilute nitric acid a very ſlight effervescence was produced which was momentary, when the ſtone was in powder; in a few hours the whole of the ſtone was diſſolved with the exception of a very minute portion of carbonaceous matter. This ſolution on the addition of ammonia afforded a copious precipitate, which was inſoluble in weak oxalic acid. The precipitate being ſeparated by filtration, the fluid was rendered turbid by the laſt mentioned acid.

Results which prove that theſe ſtones are compoſed of phoſphate of lime, with a little carbonate of lime and ſlight traces of carbon. Thus their compoſition is the ſame as that of bone partially calcined, which I have no doubt, they are in reality: their phyſical properties are thoſe of calcined bone as well as their chemical nature; calcined bone like the ſtones admits of being poliſhed, affords when breathed on an earthy ſmell, adheres to moiſt ſurfaces and in faſt has every real property which theſe ſtones poſſeſs.

Another kind of ſnake-ſtone, of which I ſaw only a ſingle ſpecimen, was a ſmall oval body ſmooth and ſhining, externally black, internally grey; it had no earthy ſmell when breathed on, and had no abſorbent or adheſive power. By the perſon who preſented it to Sir Alexander Johnstone, it was much valued and for adequate reaſon, if true, "it had ſaved the lives of four men at leaſt."

Before the blow-pipe it emitted a ſlight ſmell like that of vegetable matter burning and became white. In dilute nitric acid it diſſolved and effervesced ſtrongly, and until the whole was diſſolved the effervescence continued. The ſolution was not precipitated by ammonia, but copiouſly by carbonate of ammonia. The precipitate before the blow-pipe was converted into pure quick lime.

From theſe reſults it is evident, that this highly valued ſtone is merely carbonate of lime coloured by a little vegetable matter.

The third and laſt kind of ſnake-ſtone I have to deſcribe was of a cylindrical form, ſlightly curved about an inch in length and in circumference about three quarters of an inch; it had a ſmooth ſhining ſurface, was dark bottle green, pretty hard and rather brittle, when broken it proved to be compoſed of concentric, thin layers; it had the odour of muſk in a ſlight degree: it did not poſſeſs any abſorbent power.

Before the blow-pipe it decrepitated, fell to pieces, blackened, took fire, burnt with a very red flame and emitted much ſmoke. The coal it left was voluminous; the aſh this coal afforded when incinerated was ſmall in quantity, and conſiſted chiefly of carbonate and phoſphate of lime.

The nature of this ſtone I did not farther inveſtigate. The preceding reſults ſatisfied me that it was a Bezoar which Sir Alexander Johnstone previouſly ſuſpected.

It will naturally be aſked, are theſe ſnake-ſtones deſerving of the reputation which they have acquired among the natives; are their virtues real or imaginary? By putting the queſtion in a different form it may be ſolved more eaſily. Is a calcined bone or a fragment of carbonate of lime, or a concretion formed in the inteſtines of an antilope an antidote againſt the poiſon of ſnakes? Every one acquainted with the animal economy and the effects, and the mode of operation of the poiſon of ſnakes will (I think) decidedly anſwer in the negative. The two kinds laſt deſcribed can have no phyſical or che-

mical effect whatever as local applications; and the firſt kind can have little effect even as an abſorbent; were it indeed poſſeſſed of the ſtrongeſt abſorbent power, I am confident, its application would be uſeleſs, and worſe than uſeleſs, as interfering with the employment of efficient means of cure.

Another queſtion may be put.—Is it not curious that theſe ſtones if poſſeſſed of no real power ſhould be ſo much confided in as they are, and if deſtitute of all virtue as an antidote, ſhould be eſteemed as an antidote, and not only by ignorant *Indians*, but even by many *Europeans*.—In reply it may be generally remarked, error is popular, *quod mavult homo eſſe verum id facile credit*: appearances are deceptive and correct concluſions difficultly drawn, not to mention the effects of ſuperſtition and its influence on the minds of *Indians*. To be more particular, it may be remarked farther, that I believe the perſons who have uſed ſnake-ſtones have (independent of other ſources of miſtake,) been deceived by applying them in many inſtances to the bite of ſnakes ſuppoſed to be, but not really venomous; and in other inſtances in attributing to the ſtones, the cure which was due to nature alone.

The majority of ſerpents ſuppoſed by the natives to be poiſonous are harmleſs. Though I have been in *Ceylon* only a few months, I have already ſeen and examined twelve different ſpecies of ſnakes: of theſe only one kind was believed by the natives to be harmleſs. Notwithſtanding of the whole number, only three ſpecies proved to be poiſonous. About a week ago a ſnake was brought me by a *Modeliar*. He called it a *Mahibilla*. Though dead, the man who carried it, was under great apprehenſions of danger, and took care of him elf by carrying it tied to the end of a long pole. The *Modeliar* excuſed the man's timidity, ſaying it was very venomous; in an hour (he aſſerted) the man who is bitten by it dies.—Yet on examination, I found

that this ſnake had no fang-teeth or poiſon-bag, and of courſe was harmleſs: of the three poiſonous kind, the bite of one I have aſcertained, is never fatal even to ſmall animals and much leſs to man. The ſerpent alluded to, is that called here the *carawilla*. Its poiſon acts in a peculiar manner, occaſioning much ſwelling and pain in the part bitten. The ſwelling gradually abates. Diſagreeable ſuppurating ulcers are a frequent conſequence; but the recovery is ſpontaneous and certain. I may relate an inſtance in which a ſnake-ſtone gained much credit applied to the bite of a ſerpent of this kind. The ſtory was thus told me by a ſpectator. A native ſervant was biten in the leg by a ſerpent. A ſnake charmer was immediately ſent for. He came ſpeedily; yet before he arrived, the leg and thigh were much ſwollen. The charmer applied his ſnake ſtone which was along time continued. In about three hours the pain which at firſt was excruciating had nearly ceaſed, and the ſwelling in about three hours more had ſubſided, and the man who was travelling on foot was able to purſue his journey, which I have no doubt he would have been able to have done juſt as ſoon, if no ſtone had been applied.

The bite of the other two poiſonous ſnakes the cobra di capello (coluber naja) and the Polonga (a ſpecies of coluber) is thought by moſt of the natives to be abſolutely mortal, which is far from the truth. The effect of the bite depends on a variety of circumſtances that people in general leave out of conſideration. I have made a number of experiments with both kinds, and can ſpeak from my own experience. The poiſon of theſe ſnakes is ſoon exhauſted, when of courſe their bite is innocent. And though the poiſon be not exhauſted in the majority of caſes of the bite of the cobra di capello, and in many of the polonga, it is not ſufficiently virulent to cauſe the death of any animal excepting ſuch as are ſmall and weak.

Of all errors practical errors are the worſt; and to this claſs of errors I flatter myſelf I have proved that the belief of ſnake-ſtones being antidote againſt the poiſon of ſnakes belongs. The ſooner ſuch a belief is exploded the better. Many a life in all probability has been ſacrificed to it, that might have been ſaved by efficient means of cure timely applied, aud much human ſuffering undergone, that might have been relieved, had real, inſtead of theſe imaginary remedies been employed.

ADDITIONAL OBSERVATIONS, BY THE SECRETARY.

THE experiments of Dr. DAVY have ſatisfactorily eſtabliſhed the nature of thoſe ſubſtances termed ſnake-ſtones, and have fully corroborated the notions entertained of their compoſition and inefficacy; the concluſions that he has drawn however, were not unknown either in the eaſt or weſt, and it may not be unintereſting to take a curſory view of the opinions which have been expreſſed of their nature and properties, by preceding writers in theſe kingdoms, as well as in Europe, as a ſupplement to Dr. DAVY's analytical enquiries.

THE modern introduction of the ſnake-ſtone to the attention of the philoſophers of Europe, appears to have occurred in the latter part of the 17th century. In 1662 ſome ſpecimens were brought from India by three Franciſcan Friars, and depoſited in the muſeum of the Grand Duke of *Tuſcany*, where they were ſeen, and deſcribed by the naturaliſt *Rédi;* about the ſame time, ſome were ſent from *Java* by Sir PHILIBERTO VERNATI, to Sir ROBERT MORAY, for the repoſitory of the Royal Society: they had alſo ſome ſhort time before, been deſcribed in THEVENOT's 'relations of divers conſiderable voyages', and they were again mentioned in TAVERNIER's Travels in the Eaſt Indies.

In all theſe caſes an erroneous opinion was expreſſed of the origin of this ſtone; it was ſaid to be found in the head of the Coluber Naja and other ſerpents, and was thence termed pietra del ſerpente cobra de cabelo; lapis ſerpentis cobra de cabelo dicti; pedra de cobra, pierre de ſerpent, and ſnake ſtone, and another kind was named from the place whence it was ſuppoſed to be brought, pedra del ſerpente di Mombazza, or lapis ſerpentis de Mombazza; the deſcription of which given by Thevenot, is thus cited in the Philoſophical Tranſactions of 1665.

"In the Eaſt Indies, and in the kingdom of *Qamſy* in *China*, there is found a ſtone in the head of a certain ſerpent (which they call by a name ſignifying hairy ſerpent) which heals the bitings of the ſame ſerpent, that elſe would kill in 24 hours. This ſtone is round, white in the middle, and about the edges, blue or greeniſh. Being applied to the wound it adheres to it of itſelf, and falls not off, but after it hath ſucked the poiſon, when they waſh it in milk, wherein it is left awhile, till it return to its natural condition. 'It is a rare ſtone, for if it be put a ſecond time upon the wound, and ſtick to it, 'tis a ſign it had not ſucked all the venom during its firſt application, but if it ſtick not, 'tis a mark that all the poiſon was drawn out at firſt."

The account thus given of the origin of the ſnake ſtone, appears not to have received implicit credence; Tavernier conſiders it to be a medicinal compound, and Kæmpfer (Amœnitat exot.) looks upon it as an artificial fabrication. Thevenot ſtates particularly that the town of *Diu* was celebrated for its manufacture, and in the Philoſophical Tranſactions for 1749-50, in a communication from Sir Hans Sloane, he ſtates on the authority of Doctor Alexander Stuart, recently returned from the Eaſt Indies, that the ſnake ſtones "were not taken out of "a ſerpent's head, but made of the bones of the ſmall buffalo in the

"Indies, (by which their coaches are drawn inſtead of horſes,) the "bones being half calcined or charred by the dung of the ſame buffa-lo," the ſame is ſtated by PARR in his Medical Dictionary, in which the lapis colubrinus is ſaid to be made of hartshorn, burnt to blackneſs, and afterwards poliſhed, the whole coroborating the concluſion of Dr. DAVY, that one ſpecies of the ſnake ſtone is nothing more than bone partially calcined.

THE notion that a gem or ſtone of great value and miraculous properties was formed in the head of a ſnake, is one of conſiderable antiquity and wide circulation, and both in its early introduction and ſubſequent revival is manifeſtly of *Indian* origin. SOLINUS in his chapter on Ethiopia ſtates, that, "exciditur e cerebris draconum, draconitas "lapis," and he adds, uſu ejus orientis Reges præcipue gloriantur, quoting *Sotacus* or Σωτακος an ancient *Greek* author who wrote Περι λιθων as having ſeen this extraordinary gem. *Philoſtratus* as cited by *Salmaſius* is ſtill more preciſe as to the locality of the fable, and declares that the natives of *India* or Ινδοι cut off the head of the ſerpent in order to extract the ſtone contained in it: the ſame account of the origin of this ſtone occurs in *Pliny*, who mentions its being procured by the natives of *India* by decapitating the ſerpent whilſt aſleep, and who alſo notices the medical application by the Scythians of another ſtone ſaid to be found in the head of the viper, which is uſed as an antidote: (viperæ) diſſecant quidem Scythæ inter aures, ad eximendum lapillum, quem aiunt ab eâ devorari territa.

THE *gem* of the claſſical writers, and which according to them is not a ſtone at all, unleſs it be taken from the head of a living ſnake, is evidently the wonderful *Carbuncle* of the romance writers. It is probably alſo the ſame as the ſnake ſtone of modern travellers, although known to them only in its medicinal character. both are the

offspring of *Indian* fable, and we find accordingly in the *Sanscrit* poets frequent allusion to the stone in the head of the snake, and in the *Characa* and *Sufruta* two medical works of high authority and great reputed antiquity, the सर्पमणिः *Serpamani* or snake gem, is enumerated amongst the antidotes, and designated also by the synonime गरमणि *Garamani* or poison stone. The *Mohammedan* writers make similar mention of the snake stone, which according to the author of the *Akhtiyár Bedái* is found in the head of the *Afái* or viper: the author of the *Tohfet al Momenin* calls it *Hejar al Haiyah* and describes the *Haiyah* as a sort of snake; the latter calls it also *Mar moherch* or snake stone, and the former adds as another name *Bádzehr*, or Bezoar, considering it as the animal species of that celebrated alexipharmic, which appears in general to be the snake stone of the east, and which was one of the three kinds examined by Dr. Davy, as well as one of those described in the communication referred to above, made by Sir Hans Sloane to the President of the Royal Society.

The *Bezoar* according to our medical writers was unknown to the *Greeks*, and was first introduced to the knowledge of *Europe*, by the *Arabic* writers. There does not seem indeed to be any mention of it in the works of Aristotle or of Pliny, though we have the authority of Ibni Telmíz or Hebátallah, a christian physician who lived at the court of the Abbasside Khalif Motakki, about the middle of the 10th century, and the author of a voluminous medical work entitled *Al Moghni*, * for its being known to the *Greeks*, as he cites Aristotle as stating its being brought from *India* and *China*. Another author also

* This statement rests upon the authority of the author of the *Tohfet al Momenin*. D'Herbelot however ascribes the great work—entitled *Al Moghni* to Ebn. Beitár, and another, *Moghni fil tib*—to the son of Ebni Talmiz, or Said Bin Hebátallah. They may both be right as *Moghni* implying, the satisfier or contenter, forms part of the title of many works, especially on medicine and law.

Ebn Beit'ár quotes the same writer for its d se, in his chapter on antidotes: this testimony, which is rather suspic us, and which may have proceeded from the desire of the authors to r elter themselves under a great name, would only add an additional fac to the many we already possess, evincing the possession by the *Arabs* of many classical works, especially on the sciences, which have not come down to later ages, and will leave *Europe* still indebted to the *Ara* or *Persians*, for its acquaintance with the substances called *Bezoars*.

The name from which the modern appellati n is derived, establishes the priority of knowledge in favour of the *Pe sians*, as *Pázehr*, *Pádzehr*, or *Bádzehr*, are *Persian* words—the author of he *Jawáhir Náma* explains the term, as signifying the repeller of poison, and Meninski's Etymology therefore is not without original support پاد زهر *pad-zehr* vel. q. *Padizehr* et باد زهر *Badzeh*, compositum est ex پاد *Pad-et* زهر venenum tollens, pellens, alexi-pharmicum et lapis *Bezoar*. It may therefore be termed properly the poison stone, which is equally the signification of its *Arabic* name, *Hajar-ús Sem*, and the name by which it is usually know n of *Zehr Mohereh*.

Oriental writers distinguish *Bezoar* into two classes, or mineral and animal: the mineral sort is procured, according to Aristotle says Ibni Telmiz, from *India* and *China*; according to Abu Hinduyah, from the mountain *Zerawand* in *Cirman*: it is perhaps the fossile *Bezoar* of *Europe*, a kind of stone resembling the animal *Bezoar*, being formed of concentric layers, and similar to it, externally, in size and shape.

The other kind of *Pád-zehr* is the animal sort, called by the *Arabs* very accurately, *Hejer at tís* or goat stone; it being in fact a calculous concre-

tion found in the ſtomach of animals of the goat kind eſpecially, as is juſtly ſtated by the author of the *Tohfet ql Momenin*, who takes no notice of the fabulous generation of it by the ſucceſſively congealed rheum flowing from the eyes of a ſort of camel or deer ſuppoſed to feed upon ſnakes, as mentioned in the *Khwás al Ehjár* and other works: the *Akhtíyárát Badái* is ſingular in deriving the animal *Bezoar* from the head of a ſnake, although its preſence in the porcupine, ape and ox is noticed in ſeveral works, agreeably to the information given by TAVERNIER, who ſays with great truth, J'ay eu la curioſité de me bien inſtruire de tout ce qui ſe peut ſcavoir du *Bezoar*: of both ſpecies of *Bezoar*, many varieties, claſſed according to the ſhades of colour, are enumerated by the original authorities.

IT is foreign to the object of the preſent remarks, to notice the many wonderful properties aſcribed by oriental writers to the *Bezoar*, or to advert to any, but its ſuppoſed alexipharmic power. In this reſpect, as well as in the method of its application, it anſwers to the accounts given by THEVENOT and KÆMPFER of the virtues of the ſnake ſtone, and leaves no doubt of their general identity.

THE only remaining concluſion reſulting from Dr. DAVY's enquiries, regards the inefficacy of theſe ſubſtances, be they what they may: the credulity that prevailed on this head, has not been confined to the natives of the Eaſt, nor even to thoſe who took the oriental fables upon truſt, for TAVERNIER from information gathered on the ſpot, appears to be quite ſatisfied of their properties; and no leſs a perſonage, than the Preſident of the College of Phyſicians, Doctor BATEMAN, informed Sir HANS SLOANE with great admiration that he had ſeen the great effects upon the bite of a viper of the ſnake ſtone, or ſerpent ſtone as it is called, before King CHARLES 2d, who was a great lover of ſuch

"natural experiments." We know perfectly well now, what to think of ſuch teſtimony, and the abſolute inertneſs of theſe ſubſtances is indiſputably eſtabliſhed: in this reſpect indeed the preceding experiments, only corroborate the inference of KÆMPFER, "iſtis lapidibus "nihil efficacio ineſſe, niſi quam actuali frigiditate ſuâ, vel abſorbendo "præſtant;" and we have the authority of FONTANA, for its being known from the experiments of thoſe two great *Italian* naturaliſts, *Redi* and *Valiſnieri*, that the ſnake ſtone has no efficacy in curing the bite of vipers.

VIII.

AN ACCOUNT OF VENOMOUS SEA SNAKES, ON THE COAST OF MADRAS.

BY

DR. M^c KENZIE,

COMMUNICATED BY COLONEL M'KENZIE.

Soon after the opening of the bar in the month of October 1815, reports were circulated at *Madras*, that a great ſhoal of ſea ſnakes had entered the river, and that many natives in croſſing it had been bitten and had died. Theſe reports cauſed ſo ſerious an alarm among the natives, that they attracted the attention of the ſuperintendent of the police, who on enquiry aſcertained that three individuals after croſſing the river *had died*, and their death had been occaſioned (as was univerſally believed) by theſe ſnakes. In conſequence of this information, a reward was offered for each ſea ſnake caught on the condition of being carried to the police office.

Pandauls were erected oppoſite to the two principal fords on the river, where under my medical ſuperintendence ſkilful natives provided with Eau-de-luce and other remedies were conſtantly ſtationed, and who were directed to afford immediate aid to thoſe perſons who might be unfortunately bitten; this little eſtabliſhment was continued until the river had become nearly dry; during its exiſtence fifteen perſons (actually bitten) were carried to the *Pandauls*, all of them in a greater or leſs degree exhibiting thoſe ſymptoms conſequent upon the action of a powerful animal poiſon on the ſyſtem; to all of them, the remedies preſcribed were promptly adminiſtered, and with the happi-

eſt effect. As two of theſe caſes came under my own immediate obſervation, I have detailed them below; from notes carefully taken on the ſpot, during the continuance of the ſymptoms, and the exhibition of the remedies for their relief. To theſe two caſes I have added the progreſs and reſult of an experiment, farther corroborative of the dangerous character of theſe unwelcome viſitors.

In conſequence of the reward offered by the police, from two to three hundred ſnakes were caught alive, and chiefly by fiſhermen who were either fearleſs or unconſcious of any danger from them.

Among thoſe caught, there appeared to be a conſiderable variety, but far the greater number were of the ſpecies *Hydrus major* and *Hydrus gracilis*, of both, ſeveral were very accurately examined by my friend Mr. Ryder of the Mint, and ſome well prepared and preſerved ſpecimens have been ſent by him to a gentleman in England.

From a compariſon of theſe with the deſcription given by Doctor Shaw in his excellent Zoology, there can be no doubt as to the character of the ſnakes which made their appearance in the *Madras* river.

I shall in ſubſtance quote Doctor Shaw's characteriſtics.

HYDRUS MAJOR.

H. Lividus, faſciis decurrentibus fuſcis, ſquamis hexagonis abrupte carinatis

Its length is more than three feet, its colour pale or livid, marked throughout the whole length of the back by a ſeries of large tranſverſe ſemi decurrent duſky bands: the tail banded more deeply or ſo as to ſhew leſs of the ground colour, it is much ſtrictured at the beginning or place of the vent, and then widens conſiderably towards the tip, which is obtuſely pointed; the length of the tail is about four inches

and the ſcales which cover it are ſomewhat of a ſquare form, and ſo diſpoſed as to reſemble in ſome degree thoſe of a fiſh; they are all marked by an abrupt middle carina—the ſcales on the body are chiefly hexagonal, and are carinated in the ſame manner, thoſe on the head large and angular: along the lower part of the abdomen runs a pretty ſtrongly marked carina, the ſcales being not dilated into any appearance of ſcuts, but merely marked by a middle line of diviſion on the very edge of the carina; the vent is ſurrounded by a row of large ſtrong lengthened ſcales.

The *hydrus major* is entirely a marine ſpecies, it is furniſhed on each ſide the upper jaw with a row of ſmall teeth, one of which (two in thoſe examined at *Madras*) is much larger than the reſt, and on being examined is evidently tubular.

HYDRUS GRACILIS.

H. Corpore anterius gracillimo ſquamis ovatis lævibus, poſterius craſſiore ſquamis hexagonis abrupte truncatis.

Length about two feet, head very ſmall, and covered with large ſcales; neck and fore part of the body very ſlender and cylindric for the diſtance of about ſeven inches when it begins to enlarge, and flatten into a carina on the upper part which is continued to the end of the tail. The ſlender part above mentioned is covered with ovate ſmooth ſcales, the remainder of the animal with hexagonal ones, each marked with an abrupt central carina. The tail is about an inch and three quarters long, flat, and obtuſely acuminated but not ſo broad as the thickeſt part of the body.

The body is banded all along from the head to the tail, with numerous, equidiſtant dark and ſomewhat obtuſely pointed bands, reaching almoſt to the abdomen, which with the intermediate ſpaces is of a pale

brown colour; thoſe on the cylindric part of the body are nearly annuli; the ſtricture or contraction at the vent is not ſo ſtrongly marked as in the Hydrus major; to which in ſome particulars this ſpecies ſeems allied.

The head and mouth of the Hydrus gracilis examined at the Mint being very ſmall, the exiſtence of tubular fangs could not be ſatisfactorily aſcertained, but from the carinated ſcales added to its other characteriſtics, there can be but little doubt entertained of their exiſtence.

CASE I.

About three P. M. on the—of November, a native woman in croſſing near the land cuſtom houſe was ſeen whilſt ſtepping out of the water to ſhake off ſomething which graſped her foot, and which to ſeveral people who were looking on appeared diſtinctly to be a water ſnake, the woman after having advanced a few paces from the river fell down, and was carried to the *Pandaul* in a ſtate of apparent inſenſibility: on examining her feet, two ſmall but diſtinct wounds were formed on the ankle of the right leg, her ſkin was cold, her face livid, ſhe breathed with great difficulty and with an occaſional hickup and her pulſe at the temple or wriſts was ſcarcely to be felt: a ligature was immediately applied above the wound previouſly enlarged with a lancet, and to which a piece of the carbonate of ammonia well moiſtened with the pure nitric acid had been applied; thirty drops of the Eau-de-luce in a glaſs of water were adminiſtered nearly at the ſame time that the other means were taken: in five minutes more a ſimilar doſe was poured down her throat; this laſt ſeemed rather to encreaſe the ſpaſm at the cheſt, but the pulſe now was felt feebly, though diſtinctly at the wriſt—the third doſe was repeated in three minutes more, and upon ſwallowing it, ſhe ſcreamed and evidently breathed more freely.

TEN minutes had now elapſed ſince ſhe had been carried to the *Pandaul*, and in about three minutes more a tea ſpoonful of the Eau-de-luce was given which almoſt immediately produced violent nauſea, and cauſed a profuſe perſpiration to be thrown out over every part of her body. On putting a little ſalt into her mouth, ſhe ſaid it was not ſalt but ſugar, the natives deemed this an infallible ſign of ſtill continued danger.

NOTWITHSTANDING her improved ſymptoms an additional tea ſpoonful of the Eau-de-luce was given, and a freſh application of the nitric acid was made to the wound from which (ſhe ſaid) ſhe now felt no pain. From this period ſhe continued to recover, and in about an hour after ſhe had been carried to the *Pandaul*, ſhe was entirely relieved: complaining, only of a numbneſs in the leg and thigh above the wound, which ſenſation continued for three or four days afterwards.

CASE II.

ABOUT half paſt eight A. M. *Mahomed* a laſcar, was carried to the *Pandaul*, ſaid to have been bitten by a ſnake, about the middle of the river: advancing a few paces, after having quitted the bank he fell down violently convulſed: when brought in, his breathing was laborious, his face livid, his ſkin cold and clammy, his pulſe was diſtinctly felt at the temples, but it was feeble at the wriſt, his urine and fæces paſſed involuntarily from him, a quantity of foam and froth was ejected violently from between his cloſed teeth; with ſome difficulty, two ſmall wounds were diſcovered on the outer edge of the left foot, which on being preſſed bled a little, a tourniquette was inſtantly applied above the wound, which at the ſame inſtant was laid open to the extent of nearly an inch in this manner ⊣ and the carbonate of ammonia well ſoaked in the nitric acid applied to it—a tea ſpoonful of Eau-

de-luce in diluted brandy was with difficulty poured down his throat, which quantity was repeated every five minutes—after the third dose the ſpaſms were relieved, his ſkin became warm, and he appeared to be ſick at ſtomach, after the fourth doſe, he retched violently, and brought up a ſmall quantity of phlegm and a profuſe perſpiration was thrown out. I now conſidered his danger as much leſſened, although he ſtill continued inſenſible—the Eau-de-luce was continued and a freſh quantity of the alkali and acid was applied to the wound, in about 35 minutes after his admiſſion, and after having taken ſeven doſes of the Eau-de-luce, two of which were rejected, he was greatly relieved and ſpoke. On putting a little ſalt into his mouth he ſaid it taſted *four*, in about an hour afterwards he quitted the *Pandaul*—complaining only that his throat was burnt, and that he felt as if he had no left leg; this laſt ſenſation as in the former caſe continued for many days.

THIRTEEN others in the courſe of one month were carried into the *Pandauls*, and all of them were relieved by the ſame means promptly adminiſtered—the two caſes detailed are however ſufficient to prove the dangerous character of the ſea ſnakes, which in ſuch numbers entered the river, and I entertain the ſtrongeſt conviction that had not immediate and powerful remedies been applied many of thoſe bitten muſt have periſhed.

EXPERIMENT.

A LARGE healthy chicken was expoſed to a Hydrus major nearly four feet long, which had been caught 12 hours, during which period it was kept in a veſſel filled with freſh water—the chicken was made to preſs upon the head and body of the ſnake, but did not ſucceed in rouſing it—upon which the Hydrus was taken out of the vessel & permitted to roll about in the open verandah in the preſence of [illegible] people, the chicken was then preſented to it, made to preſs upon its

head, which at length irritated the Hydrus which was seen to bite at the chickens foot—the bird was immediately withdrawn—the marks of the fangs were perceptable though not distinctly so: but in about 10 minutes from this period it appeared to droop, and to have a slight convulsive flutter in both wings, in three minutes more it was decidedly convulsed, and at the end of 17 minutes from the period of being bitten it suddenly dropped down quite dead.

REMARKS.

From the result of the experiment, and from a consideration of the symptoms detailed in the two cases and corroborated in a greater or less degree by thirteen others, there can (I apprehend) be no doubt entertained as to the dangerous character of the hydrus species, and of the powerful effects of their poison upon the human body. It may perhaps be presumed from the *entire* recovery of fifteen persons bitten to whom the proper remedies were administered, that it might not have proved fatal, and that the poison was not so dangerous as that of many of our *Indian* land snakes: on this point I shall not venture to decide farther than to remark, that the symptoms detailed in Case 2d, followed as nearly after the bite, and were as alarming in their appearance as in the cases of those bitten by the cobra de capello; the most dangerous of our *Indian* snakes: this being so, there are no strong reasons for presuming that the results would not have been equally fatal, had the proper remedies not been promptly applied. My confidence in the volatile alkali as a powerful antidote when taken into the stomach had been long established, and in the concentrated and elegant form of the Eau-de-luce fully confirmed by the able detail of its effects, in his own case given in vol. 11, of the Asiatic Transactions by my friend Doctor M'Rae of Chittagong.

The application of the carbonate of ammonia and nitric acid to the wound ſtood recommended to me by its conſtant uſe amongſt the natives in ſimilar caſes, and after the ſtings of ſcorpions and other poiſonous inſects.

To explain why ſalt was offered to the perſon bitten, it is proper to add that an univerſal belief prevails amongſt the natives of this part of *India*, that ſalt taſtes ſweet to thoſe who are under the influence of a powerful animal poiſon, and that when this morbid taſte ceaſes, that the danger is abated or entirely over, and that all medicine may be ſafely diſcontinued.

IX.

THE RUINS OF PRAMBANAN

IN JAVA,

By JOHN CRAWFURD, Esq.

I HAVE the pleaſure to preſent the Aſiatic Society with an account of the *Hindu* ruins of *Prambanan* on *Java*. A reſidence of ſeveral years in the vicinity of this place afforded me many opportunities of inſpection and enquiry of which if I have availed myſelf with any ſkill, I may hope that my narrative may compenſate by its accuracy for its deficiency in learning.

THE principal ruins of *Prambanan*, * as the name is written and pronounced by the preſent inhabitants of the iſland, are ſituated about 10 *English* miles from *Gugyacarta*, the reſidence of the Sultan of *Java*, and about 30 from *Suracarta* the reſidence of the *Sufuhunan*.

THE high road which runs in a direction nearly eaſt and weſt, between theſe places, paſſes through the ruins.

BY far the greater part of the ruins are in the diſtrict of *Pajair* and the reſt in the diſtrict of *Matavam* where it joins the former. The country about *Prambanan* is a portion of an extenſive valley, laying between the mountains of *Rábabu* and *Márapi* to the north, and an humbler range to the ſouth called from its ſituation, near the ſouth

* As P. and B. are in moſt languages and particularly in thoſe of the *Indian* Iſlands, mutually convertible into each other, and the middle B. ſeems inſerted to obviate a hiatus. *Prambanan* probably means the place of *brahmins*, agreeably to the mode of forming ſuch nouns in *Javaneſe*.

coaſt *Gunnuncidul* or the ſouthern mountains. The moſt northerly of the ruins are not above two miles diſtant from the latter, and though many miles from the peak of *Mărapi*, nearly on the baſe of that extenſive mountain. From the more eaſterly of the ruins to the more weſterly, the diſtance is three miles and a half, and from the ruins on the more ſouthern range of hills to thoſe farthest north not leſs than three miles, ſo that the whole of the remains may be eſtimated to occupy an area of ten or eleven ſquare miles. Before offering any account of the temples I may ſhortly premiſe, that the whole of theſe buildings appear to me to have been dedicated to the religion of *Buddha*, blended with the worſhip of SIWA, of the *Linga* and *Yoni*. This will render intelligible ſome remarks on the temples which it will be convenient to interſperſe with the deſcription of them.

A FEW of the ruins conſiſt of ſingle temples, but the greater number of groups of a ſquare figure compoſed of one or more rows of ſmaller temples ſurrounding one or more great temples. The firſt of theſe groups that ſtrikes the eye of a traveller is one lying within a few yards of the high way, and immediately to the north of the village of *Prambanan*. Here a confuſed maſs of blocks of hewn ſtone, rubbiſh, rank vegetation, and rude mounds preſents itſelf. Tracing the remains of the wall, which ſurrounds this group, I found that the area occupied by it was a ſquare of about 600 *Engliſh* feet to a ſide. Running parallel with the remains of the wall are thoſe of two rows of ſmall temples at a few paces diſtant from each other. Moſt of theſe temples are nearly levelled with the ground, and none of them are perfect. They may be eſtimated to have been, when entire, about 20 feet high: each ſeems to have contained a ſingle image, the pedeſtals of which are ſtill remaining in ſeveral. This image I conjecture to have been BUDDHA, from diſcovering it in parallel inſtances

similar groups, and from the existence in the vicinity of a single mutilated statue suiting the pedestals in the temples. In the centre of the square now described are three temples lying parallel to each other, in direction north and south, and much larger than the exterior ones. That occupying the immediate centre, is conspicuous by its decorations and extent. The contents of this great temple which has four entrances and as many fanes, appear to identify the whole group of buildings with the worship of *Mahadéva*. The northern fane contains an image of his *Sácti* in the character of DURGÁ *punishing* MAHÉSASURA, the western, an image of GAN'ÉSA, their first born, and the southern an alto relievo figure of the GOD himself, in the character of a devotee. The eastern fane is so thoroughly blocked up with stones, that there is no access to it, nor is it known what figure it contains. Judging however from the other images and from similar buildings on other parts of the island, I would hazard a conjecture, that the BULL NANDY the *Váhan* of the GOD, is the image contained in this inaccessible portion of the temple.

GAN'ÉSA and DURGÁ, but more particularly the latter, are still objects of veneration with the inhabitants of *Java*. In the ancient books of the *Javanese* both are designated by their proper *Indian* names, but the vulgar denominate the former *Liman* or the elephant *God*, and the latter *Boke Lora Jungrán*, or "the virgin lady tall and thin." Barren women, men unfortunate in trade, or at play, persons in debt, and sick persons, continue to this day to propitiate the goddess DURGÁ with offerings, and I have seldom visited *Prambanan*, that I did not find her statue smeared with perfumed unguents or decked with flowers. This superstitious veneration of the *Javanese*, for the relics of their ancient worship, I discovered in one of my last visits to this place, was not

confined to the lower orders of the people, for His Highneſs the Susuhunan about a year ago when meditating, ambitious ſchemes of no common danger, made offerings to this ſame image of Durgá, perhaps, however, more particularly induced to propitiate a *Hindu* divinity on this occaſion from the nature of the connection he has ſince been known to have formed.

In a northerly direction from this group, and about half a mile diſtant from it, is the numerous group called (*) *Chandi Séwa*, or the thouſand temples, ſo denominated, not from their preciſe number, but in compliance with an idiom of the *Javaneſe* language which applies this numeral in a looſe way to any large aſſemblage of objects crouded together, of which there is another example in the ſouthern range of mountains oppoſite, which in one ſituation take from their appearance the name of *Gunnun Séwa* or thouſand hills.

The group of *Chandi Séwa* is a ſquare building of a ſimilar character with the laſt, but in ſome reſpects in a much better ſtate of preſervation. The northern and ſouthern ſides of the ſquare meaſure 600 *Engliſh* feet, and the eaſtern and weſtern 550.

This large group conſiſts of four rows of ſmall pyramidal buildings, having one great temple in the centre. The actual number of the temples is no leſs than 213; the outer row containing 78 the ſecond 66, the third which is ſeparated by a conſiderable interval from the two firſt 44, and the fourth 28. Between this laſt and the great central temple, there are the remains of a wide trench. The great central temple, which is probably not leſs than 60 feet high, has been deſpoiled of

* *Chandi* means a ſpire, not a temple for which the word is *Sangar*, but *Candi* is in modern language always applied to *Hindu* ruins.

all its images, and in one only of the 212 ſmaller temples, is there a figure remaining. This ſolitary figure is a fine ſtatue of BUDDHA, ſitting croſslegged in the uſual manner and thus meaſuring $3\frac{1}{2}$ feet high and $4\frac{1}{2}$ round the waiſt, excluding the arms. Cloſe by ſome of the other ſmall temples a number of mutilated figures of BUDDHA are ſtill found, the pedeſtals correſponding to which ſtill exiſt, in the temple themſelves, and I have little doubt, but the whole of the ſmaller temples were ſhrines of BUDDHA. Moſt of theſe were occupied ſeemingly by one image only, but others as may be ſuſpected from the niches in the walls contained one or more ſmall figures, beſides the greater one in the body of the temple.

THE principal objects of worſhip were certainly in the great temple, and from the analogy of the other buildings, I have little doubt, but MAHÁDÉVA or his conſort, and progeny in one character or another are the chief objects of worſhip.

THE ſhape of the ſmaller temples is peculiarly worthy of obſervation. From the foundation to the lintels of the doors, they are of a ſquare form, they then aſſume a pyramidal, but round ſhape, and are here decorated around, by ſmall figures reſembling *Lingas*, while a larger *Linga* ſurmounts the whole building forming the apex of the temple. This ſtructure was tolerably perfect in one or two of the temples only, but the materials of a ſimilar architecture, might in general be traced in the ruins of the reſt. This indeed in a few words may be reckoned a deſcription of the exterior of all the temples of *Prambanan*.

The group of the thouſand temples like all the others was ſur-

rounded by a wall, the veſtiges of which may ſtill be traced. To the grand ſquare there are four diſtinct gates or entrances, one on each ſide of the ſquare, and facing the cardinal points of the compaſs. At each of theſe entrances, are two gigantic ſtatues, ſeemingly in the characters of warders. Theſe are in the poſture of kneeling on one knee, and in this attitude are in heighth, excluſive of the pedeſtals, which are a foot and a half high, ſeven feet and eight inches, and meaſure round the body including the arms 11 feet. The *Javaneſe* term all thoſe figures, which are frequent throughout the Iſland, *Gopála*, and I had hence at firſt imagined them to be repreſentations of CRISHN'A, of whom this is one of the titles, but their occupations, the abſence of a crown or umbrella, or other mark of royalty, render the conjecture inadmiſſible, and the perpetual preſence of the ſnake is more probably intended to characterise the religion of *Siva*.

QUITTING the "thouſand temples" and returning again in a ſouthern direction we meet a ſingle unconnected temple which the *Javaneſe* call, for I know not what reaſon, *Chandi Aſak*, or the temple of the dog. It is a ſhapeleſs ruin diſplaying nothing remarkable, the top is open and diſplays to the obſerver the inſide of the building, deſtitute of image or ſculptures: proceeding ſtill farther in the ſame direction, but not in all above 300 yards from the 'thouſand temples', we come to a ſmall group, which contains about 15 temples including one large central one. Theſe are of the ſame pyramidal form, and differ only, in being leſs ornamented with ſculptures. The entrance into this is by a ſingle gate to the eaſtern ſide, guarded by two warders of the ſame character with thoſe already deſcribed, but of inferior ſize. All the temples of this group, have been pillaged of their images, but a ſingle mutilated figure of BUDDHA, cloſe by, ſeemed to indicate what the contents of the ſmaller temples had been.

The central temple has no leſs than 12 empty niches of various ſizes, but the principal figure of this building was probably a figure in high relief, on a large block of black ſtone, found lying near the front of the temple. I am at a loſs to point out what *Indian* divinity is intended to be repreſented by it, as the uſual emblems of the *Hindu* Gods are not diſcoverable on it. About a mile and a half to the eaſtward of the thouſand temples and cloſe to the village of *Pluoſan*, from which they take their modern name, I diſcovered in the month of April laſt, ſeveral groups of temples which had hitherto eſcaped the obſervation of our countrymen on *Java*, and indeed I believe of all *Europeans*. The natives diſplay an entire apathy on all ſubjects of this nature and the diſcovery of theſe ruins on the preſent occaſion was purely accidental. The more northern group of the temples of *Pluoſan* is an oblong ſquare meaſuring 700 feet on the eaſt and weſt ſides, and 300 to the north and ſouth. The ſmaller temples have been all levelled to the ground in this ſquare, and in entering it, one perceives in their room a maſs of ruins, and rubbiſh appearing here and there, above the long rank graſs. The ſquare appears originally to have contained three diſtinct ſets of temples, each having a large centrical one, ſurrounded by a row of ſmaller ones. The middle and more ſouthern of the central temples, are ſtill partly ſtanding, though in a ſtate of ruin. The middle temple contains two fanes, one of which however, is blocked up with maſſes of ſtone and inacceſſible. The other contains on the ſame platform or ſhelf, two fine male ſtatues in a ſitting poſture, ſide by ſide, and from the ſimilarity of the features, and whole character, evidently intended to repreſent the ſame divinity, which from the creſcent behind one of them, may be pronounced to be MAHÁDÉVA.

Of the more ſouthern temple the two fanes are ſtill entire, and contain each a pair of figures, much reſembling thoſe in the middle temple, though deſtitute of any of the more uſual emblems of the *Hindu* divinities. I have little doubt however, but they are repreſentations of SIVA to whom it is probable the whole group is dedicated.

THE interior of theſe two temples differs in a remarkable degree, from all thoſe which I have examined in other ſituations by the richneſs and profuſion of the decorations. The principal figures are thoſe of perſons of rank in an attitude of devotion. Some are ſitting and others ſtanding, but all addreſſing their devotions to the images before deſcribed. The greater number are accompanied by figures of ſlaves or ſervants holding umbrellas. The ſmaller temples as already mentioned, are all in complete ruin, but the images which they contained, ſtill exiſt, and ſeveral of them are nearly perfect, all thoſe ſurrounding the two central temples already deſcribed, are images of BUDDHA in a ſitting poſture, the right ſide of the boſom bare, the hands variouſly diſpoſed, ſometimes reſting on the knees, ſometimes as if demonſtrating or offering inſtruction, the features are elevated, the expreſſion of the countenance placid, the hair ſhort and curled, leſs reſembling nature than the effect of art, and in my judgment having no likeneſs to the woolly hair of the *African*, no more than the features, to the flat noſe, thick lips, and other characteriſtic marks of the negro countenance.

THE group of temples in the northern extremity of the great incloſure is in a thorough ſtate of dilapidation, including the central temple, yet it is remarkable that moſt of the figures ſtill remain, and many of them are entire; a fact, which ſeems to prove that religious fanaticiſm had little ſhare in the deſtruction of theſe temples. Among the images

remaining in this particular part of the building, the moſt numerous are ſtatues of BUDDHA, and there are at leaſt ten or twelve of the male divinity, images of which both in braſs and ſtone, are exceedingly frequent on *Java*, but I cannot take upon me to ſpecify its name or identify it with any of the Gods of *Hindu* mythology.

To the preſent group of buildings there are two entrances, both to the weſtern ſide, and each guarded by a pair of the gigantic warders already deſcribed. About midway between the gates I diſcovered a ſlab of black ſtone with an inſcription in the *Deva Nagari* character, much effaced and I fear illegible, except in one or two places. The ſtone is at leaſt a foot thick, and as it bears no mark of the application of blows it ſeems ſomewhat difficult, to account for its being broken as it is, unleſs we ſuppoſe that it was placed in an elevated ſituation and fractured in its fall. The temples of this group like the reſt ſeems to have been ſurmounted by a figure like the *Linga*, and ſeveral mutilated ones, were diſcovered among the ruins.

QUITTING this latter group, and proceeding in a ſoutherly direction about 150 yards, we meet with another group called *Chandi Caputren* or the ſeraglio, by the modern *Javaneſe*, from its containing female images only. (*) There is nothing of the hiſtory of theſe temples to be gathered from the modern names impoſed upon them; which imply ſome ſuppoſed uſe of the building, with a whimſical reference to their preſent domeſtic habits, wholly foreign to the real object of theſe ſtructures. The group of fifteen temples already mentioned, is for example termed *Lombon* or the granary from its ſuppoſed relation in this ſenſe to the Thouſand temples near it, and there is a ſmall temple, I re-

* Derivative according to the forms of *Javanese* Grammars from PUTRA, a Princeſs.

member in the vicinity of the great temple of *Boro Budor* in the diſtrict of *Cadu*, which is termed from a ſuppoſed whimſical relation to the latter, *Dapor* or the kitchen. *Chandi Caputren* is an oblong ſquare, the north and ſouth faces of which meaſure 300 feet, and the eaſt and weſt 200. In this group there is no temple ſtanding, but the foundation of each is diſtinctly viſible, and the enumeration of the whole proves, that they amounted to 32, appearing to have been all of equal ſize, for this group is remarkable, for containing no great central temple, and no ſtatue of BUDDHA: each temple ſeems to have contained a ſingle ſtatue of a female deity which I can only conjecture repreſents ſome mild form of the conſort of SIVA.

THE ſite of the temples of *Prambanan* is abundantly ſupplied with fine water, ſo much deſired by the *Hindus*, and ſo neceſſary to the performance of their ritual. Beſides two rivers of the pureſt water, there is between the villages of *Prambanan* and *Plaoſan* a ſmall tank, evidently an appendage of the temples. This little piece of water, is a ſquare of about 200 feet to a ſide. The ground around it is elevated, and there is every appearance of its being an artificial excavation. The whole tank is covered with the blue *Lotus*, the flower of which is ſo conſpicuous an ornament of the ſculptures on the temples.

THE *Lotus* though a native of *Java*, is generally propagated in the firſt inſtances by art, after which it perpetuates itſelf, ſo that we may hazard a conjecture, that the plants which now cover this little ſheet of water, are from the original ſtock planted by the firſt founders of the temples. (*)

* The *Javaneſe* language with its uſual copiouſness has no leſs than 10 names, indigenous or foreign for the *Lotus*, among which may be enumerated the following, viz. *Tenjun Sarója*, *Padma*, *Kamala*, *Cumuda*, *Trali*, *Saraſidya* and *Caucgara*.

The utmoſt limits of the ruins of *Prambanan* to the eaſtward, are about two miles from the village of *Prambanan*, and here in the midſt of the rice fields the ſite of an ancient temple is marked by a few ſcattered bricks, which conſtituted a part of the foundation, but more diſtinctly by two large and two ſmall ſtatues of the uſual warders. Theſe relics are all that remain of this portion of the tempels, but from them it may be ſafely inferred, that this was a group ſimilar in character to thoſe already deſcribed.

Proceeding from theſe in a ſouth weſt direction, we come to the village of *Cabon Dalam* (*) which is not above half a mile diſtant from that of *Prambanan*, and cloſe to the foot of the ſouthern range of mountains, near to the village of *Cabon Dalam* are the ruins of a group of temples, not apparently differing eſſentially from the others.

The central temple alone is ſtanding, all the ſmaller ones being in ruins, and the materials employed in the conſtruction of the rude dykes and encloſures of the neighbouring peaſantry. The temple has been plundered of its *images* whatever they were, and nothing remains to determine to what deity the building was conſecrated. The entrance to the group is by the weſtern ſide, where there are two warders, ſimilar to thoſe already deſcribed, one of them broken and ſunk in the ground. It was at this temple that my reſpected friend Colonel Mackenzie, diſcovered a ſlab of dark coloured ſtone with a *Deva Nagari* inſcription, ſimilar in appearance to that which I found at *Plaoſan*, but with the inſcription far more perfect.

Not far from theſe buildings I found myſelf about four years ago, a block of the black ſtone, which is the uſual material of the buildings,

* The Royal G...

on which was an inſcription in the ancient *Javaneſe* writing, which is a round character differing entirely in appearance from the *Deva Nagari*, though both alphabets be formed on the ſame principles. This block of ſtone from the manner in which it was faſhioned, had evidently conſtituted a part of the materials of the temples. I may here remark as a fact, not foreign to the hiſtory of the temples, that *Prambanan* is the only place on *Java* where any inſcription in the *Deva Nagari* is found, whereas inſcriptions in the ancient *Javaneſe* character are frequently met with in many parts of the iſland. The diſcovery of both in the ſame ſituation is alſo a fact worth attending to, and may be adduced in proof of the hypotheſis, to be afterwards mentioned in diſcuſſing the hiſtory of the temples.

In a weſterly direction from the village of *Cabon Dalam*, and juſt behind that of *Prambanan* we diſcover very extenſive ruins, but no temples ſtanding, theſe ruins extend to the weſt as far as the banks of the *Umpah* (*) a clear and rapid ſtream which runs in a ſouth-weſt courſe, till it empties itſelf into the ſea nearly oppoſite to *Gugyacarta*. To the ſouth the ruins extend nearly to the bottom of the range of hills. This ground is alledged by the natives to have been the ſite of a town or city and certainly has that appearance. Here the walls of a great ſquare enclo.ure are ſtill to be traced, particularly to the north and weſt ſides. By meaſuring theſe, they are diſcovered to have been 900 feet to a ſide. The appearance of the ſquare, is that of a modern *Craton*, and tradition relates, that it contained the King's palace, but of this there is no veſtige; towards the eaſtern ſide of the enclo.ure, are however to be found a number of images of a very intereſting and determinate character. The ruins of the temples in which theſe were contained, form as at *Cabon Dalam*, the materials of the rude dykes

* *Umpah*, means pedeſtal or ſtand, poſſibly from its waſhing the foundations of a number of the temples and other buildings.

which separate the neighbouring fields and gardens. Among the moſt remarkable of the figures here diſcovered, may be mentioned a repreſentation of *Surya*, with his ſeven headed horſe; the driver *Arun* does not want the legs, as he is more commonly repreſented. A figure of *Mahádéva* (*) more diſtinctly marked than uſual with images of this God on *Java*, a ſcull in his crown, the *Pás'a* in one of his four hands, and a creſcent at the back of the image. Another figure of the ſame God, four handed and not leſs diſtinctly marked by the known attributes, of this divinity, for behind the image there is a creſcent, and in its crown a garland of ſculls: ſeveral figures of *Gan'és'a*, one of them diſplaying the God, ſhaded by a hooded ſnake, the only inſtance I can recollect on the iſland of this image ſo characterized; and here are alſo ſeveral ordinary figures of BUDDHA. But the moſt remarkable relics of this place, are three erect but mutilated ſtatues of a male divinity, which I have no where elſe obſerved. Each is accompanied by its *Váhana*. The firſt having the *Bull Nandi*, is no doubt *Siva*, and I ſhould have as little doubt, but the other two, whoſe *Váhan* is *Garuda*, are *Viſhnu*, but cloſe to all theſe are as many correſponding *Yonis*, which on being meaſured are diſcovered to fit the lower parts of the images, which therefore there is no doubt, were the correſponding *Lingas*. Notwithſtanding the appearance of *Garuda*, therefore it ſeems pretty certain, that the temples of this portion of the ruins alſo were like the reſt, dedicated to the worſhip of *Mahádéva*, of the *Linga* and *Yoni*, coupled with the doctrines of BUDDHA.

ASCENDING the range of ſouthern hills ſo frequently mentioned, and in a direction nearly due ſouth from the relics juſt deſcribed, we find not above a few hundred yards from the rugged brink of the hills, the remains termed by the *Javaneſe*, the *Craton* or royal reſidence of

* Neither MAHA DEVA nor his *Sacti*, are ever to my knowledge found on *Java*, with the third eye in the forehead, as they ſo frequently are repreſented in India.

Boco. (*) The real figure of this ruin, which appears from the rankneſs of the vegetation under common circumſtances, a maſs of inextricable confuſion, was diſtinctly aſcertained by burning and deſtroying the graſs and trees. It proved to be a ſquare terrace conſtructed of huge blocks of hewn ſtone, meaſuring 68 feet to a ſide, and being four feet high. This terrace is ſurrounded at the diſtance of 14 feet, by a wall aſcertained from a ſmall portion of it, yet nearly perfect, to have been 11 feet high. In this there are four doors, which I found by a mariner's compaſs to face the cardinal points: I may here obſerve, that as this appears to have been an object aimed at, throughout the whole of the buildings, it would be a curious point to determine with what degree of preciſion the object has been attained, as from this, the ſkill of the artiſts and the nature of the inſtruments which they employed might be aſcertained. On the top of the terrace in two ſituations, are ſeen ſome loſe blocks of ſtone which appear to have conſtituted the elevated foundation of the ſheds, which the *Javaneſe* I believe in imitation of the *Hindus*, term *Pandapa* or *Mandapa*, it is in ſuch ſituations as theſe, that the modern princes take their ſeat on public occaſions, and to judge from this as well as from the reſemblance of the terrace itſelf, to thoſe of a modern palace called the *Sitingil*, (†) I have no heſitation in aſſenting to the common tradition that the preſent ruin was really a palace. Dr. TYTLER who accompanied me in one of my laſt excurſions to *Prambanan*, diſcovered in the largeſt of the two pillars of ſtone on the terrace, a fragment of a ſlab of ſtone on which was a *Déva Nagari* inſcription, and a little way to the ſouth of the building a mutilated ſtone figure, which I imagine to repreſent *Mahá Déva* deſtroying *Tripuraſuru*. The inſcription, the image, the nature of the materials and the character of the architecture, ſeem diſtinctly to identify theſe buildings with the ruins on the plain.

* *Craton*, is a derivative from RATU, a king or ſovereign prince.

† *Sitingil* literally high ground or land.

QUITTING the ruined palace and proceeding about half a mile in an eaſterly direction, we diſcovered two artificial excavations in the rocks, the largeſt of which is 14 feet long and 10 broad, having a bench towards the back part to ſit or recline on; they are not above three feet high; between the caves is a ſmall tank about 6 feet deep like the caves cut in the rocks. I have no doubt that theſe excavations, conſtituted the retreat of holy devotees, who ſought a reputation by the performance of thoſe auſterities believed ſo efficacious, according to the religious ſyſtem of the *Hindus*. After leaving the caves and going eaſtward about two miles as far as I could conjecture, amidſt the mazes of a difficult foreſt, we came to a ſolitary temple or rather the ruin of one. This the *Javaneſe* call *Chandi Baron* a term of which I never could obtain a ſatisfactory explanation. From the nature of the materials, and judging from the little that yet remains ſtanding of the fabric itſelf, we may plainly diſcern that this temple is of the ſame character, with thoſe of the plain. Since I viſited it, I have been told that a ſtatue of GANÉ'SA has been dug up from the ruins. Such a ſituation as that occupied by the ruins now deſcribed, is one that never would be choſen by the preſent race of inhabitants, whoſe intereſts confine them to the plain and all the modern ſeats of *Javaneſe* government are in the latter ſituation. The builders of *Prámbanan* muſt therefore have been actuated by different motives, and theſe motives are diſcovered by a reference to the *Indian* precept, which directs a *Hindu* prince to chooſe the faſtneſſes of the mountains for the ſeat of his government.

RAJA BACA ſtated by tradition to be the builder of *Prámbanan* is wholly unknown in the hiſtories of *Java*, but by name, and by the ſingle circumſtance of his being ſtated to have been defeated by a *Javaneſe* prince of the name of BANDUN.

Such are the whole of the ruins found in the diſtrict of *Pajan*. The river *Umpah* divides this laſt diſtrict from *Mataram*, and on its weſtern bank is the village of *Bogam* cloſe to the road ſide, near which are ſeen four gigantic ſtatues differing from any yet mentioned.

The following is a brief deſcription of theſe ſtatues. The ſtatue is ſitting croſs legged, and thus meaſures ſix feet high, and ſeven feet three inches acroſs the breaſt including the arms. The figure has an elevated crown, the facerdotal cords, armlets, and a breaſt piece in the uſual manner, but it wants as far as I can aſcertain any diſtinguiſhing attribute of an *Indian* divinity. Theſe figures are in a ſuperior ſtyle of ſculpture. In the village of *Bogam* I found a well ſculptured *Yoni* which was uſed by the peaſants as a block for huſking rice.

As the traveller paſſes on to the town of *Ayugacarta*, the road is croſſed about three quarters of a mile from *Prambanan* by a ſecond ſtream called *Cali Banin*, or the clear river, an epithet ſo univerſally applicable to all the rivers in the interior of *Java*, that it is not eaſy to gueſs why it ſhould be particularly applied to one. Not far from the weſtern bank of this itle ſtream, and within a dozen yards of the ſouth ſide of the high road, there is a ſingle temple which like all thoſe yet undeſcribed takes its name from the river near it. This is upon the whole the moſt highly finiſhed, the moſt perfect, and in ſome reſpects the moſt intereſting, of the ruins of *Prambanan*, and therefore I ſhall be more particular in my deſcription of it. The temple is of a pyramidal ſhape, and differs chiefly in its greater ſize and the ſuperior ſtyle of the decorations from the other temples.

The whole building reſts upon an artificial and elevated foundation, which judging from ſimilar ones that have been traced, is probably of

brick, on this foundation there is a terrace of hewn ſtone, five and a half feet high. The conical part of the building is reduced to a ſhapeleſs maſs, and the lower part only which is about 40 feet. is entire. This contains two great fanes to the east and west, and two ſmall chambers to the north and ſouth.

The exterior of theſe compartments meaſures, the east and weſt, each 43 *Engliſh* feet wide, and the north and ſouth, each 26 feet. Lying between theſe four faces of the building, are four angular double ſided projections facing the intermediate points of the compaſs, thus giving to the whole building 12 faces of various dimenſions.

The entrance to the principal fane is to the east, by a flight of ſeven steps to the terrace from which you enter the body of the temple through a porch: directly fronting you, there is the remains of what has the appearance of a handſome altar piece, over which there is a niche, which ſeems to have been occupied by the chief object of worſhip when the temple was entire: within the porch, and on each ſide as you enter there are two niches for full length figures, but every image has been removed from the interior of the temple. The weſtern ſide differs from the eaſtern in the ſmaller ſize of the chamber, to which there is no acceſs by a porch, and it is in a ſtate of much dilapidation. The entrance into the northern and ſouthern chambers is through a mean door, and directly by a flight of ſteps of the ſame hewn ſtone as the reſt of the building. Theſe are dark priſon like apartments, and have by a minute aperture a communication with the great eaſtern fane. They had each contained an image, the pedeſtals of which are ſtill ſtanding. In various parts of the outſide of the building, no leſs than 12 great niches may be counted. At the entablature and cornicing, which terminate the ſquare ſhaped portion of the

building, a number of ſmaller niches are to be ſeen all round this part of the building, in two of which we diſcovered that images of BUDDHA in a ſitting poſture ſtill remained, and mutilated figures and fragments of others were found ſcattered through the ruins round the temple, ſo that the whole of the empty niches of that part of the building were in all likelihood ſimilarly occupied.

IMMEDIATELY above the figures of BUDDHA where the temple begins to aſſume a conical ſhape, ſeveral figures, apparently of the *Linga*, are ſtill ſtanding, and a great many more both whole and mutilated are found ſcattered among the ruins. On inſpecting the exterior of the temple, we diſcover the eaſtern and ſouthern ſides, the latter in particular, in a much ſuperior ſtate of preſervation to the northern and weſtern, which is readily accounted for, when we advert to the circumſtance of the latter being expoſed without protection to the ſtorms and rains of the weſtern ſeaſon, while the former are protected by the range of hills, even from the milder influence of the eaſtern ſeaſon. In the eaſterly and ſoutherly ſides of the building, the ſtructure is indeed in a ſtate of freſhneſs, not to be ſeen throughout any other part of the ruins of *Prambanan*, diſplaying to great advantage the minuteneſs, and I may add the perfection of the workmanſhip. Here is to be ſtill diſcovered, what has long ago been effaced in the reſt of the temples, a fine coating of mortar which covered the buildings, and gave the laſt finiſh to the labours of the artiſt. The plaſter is about the eighth part of an inch thick, and acheres to the ſmooth ſtone with wonderful tenacity, a ſatisfactory proof of the excellence of the compoſition, and the ſkill of the builder. Nothing can be more different than the mortar at preſent in uſe, which is both ill-concocted and unſkilfully applied, yet notwithſtanding the excellence of the former, when I conſider the manner and ſituation in which it is applied, that it has diſappeared where expoſed to the inclemency of the weather, and been

preſerved only under favorable circumſtances, I muſt look upon this as one proof in favor of the opinion to be afterwards offered, that the temples of *Prambanan* are not of a very remote antiquity: but rather comparatively modern ſtructures.

A FEW hundred yards to the weſt of the temples now deſcribed, are the remains of a group ſimilar in character to all thoſe already deſcribed. The mere foundations however, only remain, and even theſe have been very recently diſturbed for the few bricks they contained, and which were to be traced in the piers of a bridge cloſe by. The pedeſtals of a number of a very large ſtatues are ſtill among the ruins, and four huge warders have by their ſize eſcaped the general deſtruction. Theſe it may be remarked appear as double centinels to one entrance on the ſouth ſide of the ruin.

WE ſee indeed from a retroſpect of the ſituation of the warders, throughout the ruins, that there is no one eſtabliſhed mode of diſpoſing of them, and that the entrance to the temples may be towards any one, or all four of the cardinal points of the compaſs. Here the entrance is to the ſouth, at *Plaoſan* there are two entrances to the weſt, in the fartheſt eaſt of the temples, the approach is to the eaſt, and at the "thouſand temples" there is one at each of the four quarters. Nearly oppoſite to theſe ruins and to the north ſide of the high road is a temple differing entirely in ſhape from all the reſt, but from the character of the architecture, and the nature of the ſculptures and decorations, evidently connected with the ſame religious worſhip, and conſtructed by the ſame people as all the others. It has ſomething of the appearance of a long barn, and conſiſts of two ſtories with an arched roof. Within it is divided into three chambers, the largeſt in the centre, and this communicating with the two ſmaller ones at the ends From the regular ſets of correſponding apertures in the oppoſite walls,

there is no doubt, but the building when complete had an upper floor, and we may conjecture from the abſence of ſtone beams, or any relic or fragments of them, that this portion of the building was of wood.

In the walls in all directions there are many niches, no doubt as in the other ruins intended for the reception of images, from which circumſtance, as well as the coſtly and luxuriant decorations on the exterior walls, there can be little heſitation in concluding that this building was a place of religious worſhip, and not as ſome have conjectured a dwelling houſe.

There is as already mentioned a profuſion of ſculptures on the exterior walls, which as in the other buildings, conſiſt of full length figures male and female in relief, flowers and other ornaments, of which it is unneceſſary now to offer any account as they will be included in the general deſcription of the prevailing decorations of the temples to be afterwards given. Such is a brief document of the principal remains at *Prambanan*; the extenſive and fertile valley in which they lie, contains a number of inferior relics connected with the ſame worſhip, which it would be too tedious to enumerate, and I have therefore circumſcribed my ſubject within the narrowest limits.

This particular part of the iſland has juſtly been a favourite ſeat of *Hinduism*, and among the modern names of places we can ſtill trace, as in many other parts of the iſland, the claſſic names of *Indian* story. I ſhall give but one example. The town which the *Dutch* have corrupted into *Dyoyocarta* is the indian *Ayodya*, the country of Rama Chandra: the place before it became in the year 1761, the reſidence of the ſucceſsful rebel Mancu Bumi, was called *Ayugya* (a corruption of *Ayodya* originating in the peculiar enunciation of the *Javaneſe*) which he changed into the compound *Ayugyacarta*, written from the imperfection of the

modern alphabet which wants initial vowels, *Nuyugyacarta*: it is ſingular to trace the corruption which words are doomed to undergo; the *Sanſcrit* word *Ayudya* becomes in *Engliſh* Oude, in *Javaneſe Nayugya*, and in *Dutch* ſtill more barbarouſly *Djoyu*. The temples of *Prambanan* are built of a hard dark and heavy ſpecies of baſalt called by mineralogists trap. This I am told by Doctor Horsfield is the chief component part of the mountains of *Java*. In the foundations and coarſer parts of the buildings an inferior material, a kind of white ſoft ſtone in various degrees of aggregation is to be found. The black hard ſtone is uſually hewn into ſquare blocks of various ſizes. The reſpective ſurface of the ſtones which lie on each other in the building, have grooves and projections adapted to each other; they are regularly arranged in the building in ſuch a manner as to enſure the greateſt ſtrength and ſolidity in the ſtructure, and no mortar is any where had recourſe to as a cement. With materials of ſuch excellence the conſtruction of the temples of *Prambanan*, cannot be contemplated as a taſk of very extraordinary difficulty, for there is neither boldneſs nor grandeur in the deſign. There is nothing here upon a great ſcale, nothing but what ſeems within the reach of the moſt obvious mechanical contrivance, the moſt ordinary efforts of common ingenuity. What we are chiefly ſtruck with is the minute laborioufneſs of the execution. Its ſucceſs is alſo calculated to excite our admiration, though no doubt the effect is hightened by the compariſon which we are apt to make between theſe ruins, and the rude effects of the modern art of the *Javaneſe* by which we are ſurrounded.

Upon the whole there is neither grandeur nor ſublimity in the temples of *Prambanan*. The want of pillars conveys a diſagreeable impreſſion of heavineſs and inelegance, the buildings are themſelves too

called ſo, is to be diſcovered on all the moſt perfect *Hindu* temples on ſmall, the entrances are mean, and the interior conveys more of the gloom of a vault or priſon, than of the awe which ought to attach to a place of worſhip. For the place they are in, they are indeed wonderful ſtructures, but one muſt be a *Hindu* to view them with any thing like enthuſiaſm. The ſculptures and decorations of the temples are endleſs, but ſome are ſo predominant and characteriſtic as to deſerve particular notice: one remark reſpecting all of them may be premiſed, that they muſt have been executed after the erection of the walls, the only obvious and practicable means, indeed of delineating figures and groups of ſuch extent on a variety of different ſtones. The firſt part the ſculptures of the temples, which I ſhall mention are the human figures which are ſo often delineated in relief on the walls. Theſe are ſometimes male and ſometimes female, and are executed with conſiderable ſkill, the artiſt often ſucceeding in conveying to the figures even a portion of eaſe and grace. Theſe ſculptures are I think univerſally deſtitute of the characteriſtic emblems of the *Hindu* Gods. They are as invariably without armour of any kind. Neither their countenances nor attitudes portray any remarkable activity of mind or body. Their mild but paſſive forms not deſtitute of ſome grace would ſeem rather emblematical of that benevolence and tender heartedneſs ſo vaunted in the doctrines of BUDDHA, but of which ſo little is diſcoverable in the conduct of the modern followers of this worſhip, if we form our concluſions from the character of the people of *Ava* and *Siam* or of the inhabitants of *Ceylon*, all of them probably the moſt remarkable for cruelty of any people of *Aſia*.; The next decoration of the temples which I ſhall mention is a monſtrous face without a lower jaw, found in the moſt conſpicuous part of the temples, particularly over the key ſtones of the arches, and towards the angular projections of the buildings. The ſame ornament if indeed it can be

called ſo, is to be diſcovered on all the moſt perfect *Hindu* temples on the iſland, and is particularly frequent on the great temple at *Boro Bodor*. It is remarkable that the preſent race of *Javaneſe*, particularly thoſe of the eaſtern end of the iſland where *Hinduiſm* is known to have flouriſhed moſt, before its extinction, wear this monſtrous face on their criſſes. It is ſtill more frequent with the *Hindus* of *Bali* and *Lomboc*, who are worſhippers of SIVA: it is generally a moveable piece of gold fixed to the upper part of the ſcabbard on which the figure is embоſſed, and which differs in no manner from thoſe delineated on the temples. The ambaſſadors of the Raja of *Lomboc* informed me, that the face was a repreſentation of SIVA. I may remark that I found it delineated on one of the fineſt figures of the *Yoni* at *Prambanan*, and its being diſcovered in a ſituation ſo decidedly identified with the worſhip of MAHÁDÉVA, may be adduced in confirmation of the opinion that it is intended to repreſent this God.

THE moſt frequent ornament on the buildings is the *Lotos*. It is indeed almoſt univerſal on all the *Hindu* relics on the iſland. The ordinary figures on the outer ſide of the walls of the temples are never without a plant of it, and even the deities themſelves, of all deſcriptions are generally ſculptured with it. In the ſtatues whether of braſs or ſtone, found throughout the iſland, the pedeſtal very uſually conſiſts of the expanded calix of a *Lotos*, and the female figures in particular are perpetually attended by it. I ſuppoſe the *Lotos* to be here an emblem of PARWATI who as well as SRI I find, has the epithet of PADMI in the nomenclature of the gods. This I infer however, only from the ſuppoſition already ſo often made of their temples being peculiarly dedicated to the worſhip of SIVA. This may probably be conſidered as in ſome degree corroborated by the circumſtance of the calix of a *Lotos*, being frequently ſubſtituted for the *Yoni*.

Small figures in brafs and ſtone with the *Chanc* and *Lotos* are very frequent on *Java*, which I ſhould have concluded to have been LACSHMI, but as VISHNU himſelf, or his *Avatars*, are ſo ſeldom met with, and as I have I think never ſeen the CHACRA accompanying any image whatever, I muſt rather conſider figures ſo decorated, as forms of the conſort of SIVA. The prevalence of vegetable decorations throughout the temples of *Prambanan*, cannot but attract notice. This I think may be fairly aſcribed, to the principles of the followers of BUDDAH, who profeſs to abhor the ſpilling of blood. It would be endleſs to recount the varieties of theſe: the greater number however, ſeem rather the productions of imagination, than of nature.

THE outer ſides of the walls conſiſt uſually of large compartments, ſub-divided by ſculptured pilaſtars: theſe are generally ſurrounded by borders of flowers, or fanciful ornaments, while the interior is occupied by figures of trees and plants, of animals, or of both. A bird of the parrot kind appearing in the folds of a feſtoon of flowers, is a very common border, both in the ruins of *Prambanan*, and *Boro Bodor*.

ANIMALS are not frequent on the ruins of *Prambanan*; but they do occur ſometimes: the moſt uſual are the lion, and the elephant, animals that are no natives of *Java*. It may be offered indeed as a general remark, that the animals and plants, as well as the human figures delineated, are all of them foreign to the iſland. Groups or hiſtorical repreſentations, which abound ſo much at *Boro Bodor*, are ſeldom to be ſeen at *Prambanan*. I can ſtate but one exception, which is a repreſentation of the warlike apes of RAMA, upon ſome looſe ſtones which cannot at preſent, be traced to the temples to which they originally belonged.

THROUGHOUT the whole of the buildings, there is one general obſervation, which may be made upon them, viz. that they are diſtinguiſhed by a commendable decency, and among the great variety of repreſentations which is found I ſhould be at a loſs to point out a ſingle object that could give offence to the moſt faſtidious delicacy. This is the more remarkable, when we advert to the nature of the religion to which theſe temples are dedicated, and contraſt them in this reſpect with the groſs indecencies, which ſo frequently diſgrace the temples of *Hinduſtan*. After this ſketch of the temples and their decorations, I ſhall make a few obſervation on their æra, on the nature of the agency by which they have been brought to their preſent ſtate of dilapidation, on the nature and character of the worſhip, to which they appear to have been dedicated, and laſtly offer ſome conjectures reſpecting the founders of theſe remarkable ſtructures.

I HAVE already hinted that the temples of *Prambanan*, are not of a very remote antiquity, and accordingly in the memorial verſes, as SIR WILLIAM JONES, calls them, in which the chronology of the *Javaneſe*, as well as of the *Hindus* is preſerved, the date of the oldeſt of the temples, thoſe to the eaſt of the river *Umpah*, goes no further back than 1188 of *Salivana* or *Saca*, as it is called in *Java* and *Bali*, and the other temples, thoſe to the weſt of that river, are by thirty years, more modern. This traditional date, for it can hardly be conſidered as much better, is however corroborated, in a remarkable degree, by the approximation to it which is diſcovered in all the monuments ſituated in the ſame part of the iſland; none of theſe go farther back than the beginning of the 12th century of *Salivana*, and none of the real hindu temples which bear the mark of an indian origin later than the middle of the 13th: the whole reign of genuine *Hinduiſm*, as well as can be aſcertained from ſuch dates, is confined

in the central diſtricts, to a period of about 143 years. On a braſs caſt of BUDDHA, found not many miles from the ruins of *Prambanan*, there is I am told inſcribed in the *Deva-Nagri* character, the preciſe year, alleged to be that of the building of the oldeſt of the temples of *Prambanan*, or 1188: on two of the aſtronomical braſs cups ſo frequently met with, and which were brought from the diſtrict of *Pachitan*, there are inſcribed in plain figures in the ancient *Javaneſe* character the years of *Salivana* 1241 and 1246. The æra aſcribed to the building of the temple of *Boro Bodor*, which is in a far higher ſtate of preſervation, than thoſe of *Prambanan*, is 72 years more recent than the oldeſt of the latter. From all, theſe facts, and the internal evidence afforded by the ſtate of the ruins themſelves, I conclude that the æra alleged for the building of the temples of *Prambanan* is not far from the truth or at all events, is exceedingly probable. It may here be remarked, that while the eſtabliſhment of *Hinduiſm*, cannot be traced farther back than the beginning of the 12th century of *Salivana* in the centre of the iſland, there are ſeveral monuments in the eaſtern end which prove its exiſtence there at leaſt 400 years earlier.

THE dilapidation which is diſcoverable in the temples of *Prambanan*, is ſoon traced to its true cauſes, by a careful conſideration of the buildings themſelves, an attention to the phyſical circumſtances of the country, and the character of the population. The chief cauſe of deſtruction, is I think, the luxuriance of vegetation peculiar to the climate. The ſolidity of the ſtructure, however admirable, is little calculated to reſiſt this ſpecies of depredation: the tendrils of a variety of creepers inſinuate themſelves into the minuteſt chinks of the buildings, and ſoon growing into trees of 8 and 10 inches in diameter, their deſtructive effects become quite irreſiſtible, in ſtructures neither protected by mortar, nor bound by bars of metal, which might have protracted their fall. The progreſs of this ſpecies of dilapidation, is diſ-

coverable throughout the whole of the buildings.

THE next moſt powerful cauſes of dilapidations, are the earthquakes, ſo frequent in theſe volcanic regions, under which may be compriſed the concuſſions, from the active ſtate of volcanos, the crater of one of which is not perhaps 15 miles in a direct line from the buildings, and the effects of the eruptions of which may be traced to within two or three miles of the temples themſelves.

A THIRD and effectual ſource of deſtruction is the removal of materials, for œconomical purpoſes, and of the images, and ſculptures from miſplaced curioſity; of this ſource there are ample traces, not to mention that the neighbouring dykes, are chiefly compoſed of the ſtones, of the temples: in ſome places, a *Yoni* will be found as a rice mortar, and in others the *Linga*, buried in the ground to a ſufficient length to afford a convenient ſeat: at the town of *Ayugyacarta* I diſcovered a great many images, and traced a large portion of them, to *Prambanan*, from whence ſome of them, had been brought within a few years only.

A FOURTH ſource of deſtruction, which I chiefly ſtate on the authority of the natives, has been the ſearch for hidden treaſure: evidences indeed of the frequency of this practice, may be traced among the ruins, in the pits ſurrounded by excavated earth, ſtones, and rubbiſh, which are ſo often ſeen.

AMONG the cauſes of the dilapidation, of the temples of *Prambanan*, I have not included, though it may at firſt ſight appear a probable one, the effects of the fanaticiſm of the early mahomedans: my chief reaſons for believing that religious zeal, had little ſhare in their deſtruction, are in the firſt place that no marks of wilful and malicious violence, are diſcoverable either in the temples of *Prambanan*, or any other on the iſland: many of the images, which would

naturally be the firſt objects of deſtruction with the zealots, are quite entire, and all of them, will be diſcovered to be in a ſtate of preſervation proportionate to that of the temples, in which they ſtand: when theſe have fallen in, the images will be found either cruſhed, mutilated or ſlightly injured in proportion to the weight of the incumbent materials.

In the ſecond place, it is to be remarked, that judging from the reſpect, in which theſe temples are ſtill held, we may infer the veneration with which they muſt have been conſidered at the period of the converſion, and that immediately ſubſequent to it, and hence conclude the improbability of any violence being offered to them: the converſion of the *Javaneſe* indeed was rather the effect of a ſort of faſhion, and of example, than conviction: after the diſcipline of near three centuries and a half they are ſtill but luke warm mahomedans: prudential motives would therefore have actuated even the moſt fanatic of the earlier leaders of *Mahomedaniſm*, to reſpect the objects which were venerated by the people. From the facts handed down to us reſpecting the hiſtory of this converſion, we are indeed made acquainted with the extraordinary attention, paid by the early leaders, to the prejudices of their followers, for in many reſpects they rather blended *Iſlamiſm* with the ancient ſuperſtitions of the country, than eſtabliſhed a thorough revolution in religion, a fact on which probably hinges the chief ſecret of their ſucceſs.

I am inclined to conſider the religion of the founders of *Prambanan*, as a genuine example, of the reformed worſhip, of Buddha. I venture to conjecture, that the religion of Buddha as practiſed on *Java*, was not the worſhip of any deified perſon of this name, but a reformation of the bloody rites of Siva and Durgá brought about by certain ſages or philoſophers, who are repreſented by the images of Buddha.

The *Javaneſe* of the preſent time, call their ancient religion, Agama Buddha, which I underſtand may be rendered from the *Sanſcrit*, "the religion of the philoſophers." It is remarkable, that among the *Javaneſe*, the name of Buddha, is wholly unknown to perſons of education, who are at the ſame time well acquainted with all the other *Hindu* gods, nor is it to the beſt of my knowledge, to be diſcovered in the relics of their ancient writings, which are crowded with the names of the indian divinities. (*)

The moſt ſtriking fact however in corroboration, of the opinion, I have advanced, is that the ſtatues of Buddha, are never found in the great central temples, where we expect the principal objects of worſhip. On the contrary, they ſeem rather to be in the ſituation of votaries themſelves: at *Chandi Siwu* for example they appear occupying the ſmall temples only, and looking towards the great central building would ſeem as if adoring the object placed there. The ſame thing is the caſe at *Plaoſan*. (†)

Conformably to this opinion, of the founders, of *Prambanan*, practiſing a reformed worſhip of Siva I think we may obſerve that the repreſentations of this divinity, and his Sacti, are in their mildeſt forms. The moſt wrathful form, of Durgá on *Java*, the horrid divinity to whom human ſacrifices were offered in India, is her puniſhment of the demon of wickedneſs, an act rather of beneficence than cruelty: except on this occaſion, ſhe is pourtrayed as a rather handſome and un-offending female.

(*) The modern Javaneſe use the word Budha, or as they write it Bada or Budo the nearest approximation to the true orthography which their alphabet will afford, to express what belongs to ancient times, that is to the times when they were *Buddhiſts*.

(†) I have seen a ſtatue of Buddha more than once with a *Linga* growing from the crown of the head.

MAHA-DÉVA I have seen on one occasion (*.) sitting on a pile of human sculls and decked with a neck-lace of the same materials. At *Prambanan*, he appears once, as already mentioned executing vengeance on a tyrant, but by far the most frequent form, of this deity on *Java*, is that of a venerable and harmless devotee.

WE may be convinced from a variety of facts, that the buildings of *Prambanan*, and all similar structures, are not the work of the natives of the country, but of foreigners and were we to draw any conclusion in favour of the general civilization of the people, from the perfection attained in these, we should argue erroneously. *Hinduism*, or at least the doctrines of BUDDHA, flourished on *Java* for a period of about 500 years, when the emigrations from India ceasing or becoming less frequent, the *Javanese*, were left to themselves, and the monuments, erected from this time, until the utter overthrow of *Hinduism*, a period of more than a century, evince the rude state of the arts among them, and sufficiently attest, that *Prambanan*, and all monuments of a similar nature, were not the work of the natives. The best examples of this degeneracy, are in the *Hindu* relics, discovered in the mountain of *Lawa*. These are evidently dedicated to the same worship as the others, but they are remarkably rude, and on the slightest inspection, are discovered to be the work of a very different race of people, from the older temples. On the buildings at *Sucuh*, to the northern side of the mountain, there are the dates 1361, and 1362, only 38 or 39 years, before the establishment of *Mahomedanism*, and a century posterior to the building of *Boro Bodor*, the last of the genuine *Hindu* temples. If farther proofs were required,

(*) One of six statues now at *Samarang*, and by far the finest on *Java*. They were brought from *Tunam-arsun* (garden of perfumes) in the district of *Malang* towards the eastern end of the island. This is said to have been the principal place of worship of a race of kings, whose residence was at *Suhasari* in the same district. The six statues are, the figure of SIVA, already mentioned, a figure of DURGA punishing MAHESASURA, a statue of GANESA, one of NANDI and two gigantic male statues, one of them with a trident which I take to be also figures of MAHADEVA.

that the natives of *Java*, were not the builders of *Prambanan*, or ſimilar ſtructures, I would obſerve that in a period of 338 years, which has elapſed, ſince their converſion to *Mahomedaniſm*, during which they have been, in matters of this nature nearly left to themſelves, they have not conſtructed a ſingle building, that can be compared with even the rudeſt of the *Hindu* temples, and their moſques of the earlieſt and lateſt periods, are mean and paltry wooden fabrics, utterly unworthy of any notice.

The country of the founders of *Prambanan*, and of all others, who propagated *Hinduiſm* on *Java* is certainly the kingdom of *Telinga*, on the peninſula of India or *Calin*, as it is univerſally written, and pronounced in *Java*, and every other country of the Archipelago: this is the only country of India, known to the *Javaneſe*, by its proper name, the only one familiar to them, and the only one of which mention is made in their books. Hence they deſignate all India by this name, and know it by no other, except indeed, when by an excuſable vanity, they would infer the equality of their iſland, with that great continent and ſpeak of them relatively as the countries on this, or on that ſide of the water, common modes of expreſſion. It may be farther ſtated, that *Javaneſe* tradition, invariably aſcribes the introduction of *Hinduiſm*, to the natives of *Telinga*. The principal native intercourſe between India, and *Java*, as well as the other iſlands, down to the preſent, is from the ſame countries. That the intercourſe was at all events, with the countries on the eaſtern coaſt of the peninſula of India, may be inferred by the ſtriking agreement between certain remains of the ancient inſtitutions of *Java*, and thoſe peculiar to the Indian countries in queſtion. The moſt remarkable example is afforded in the calendar (*) the æra of *Salivana*, which is that, which exiſted on *Java*, is in India, I believe nearly confined

(*) This renowned perſonage is unknown in the Indian iſlands by the name of *Salivana*, the

to the *Deccan*. The year in *Carnatic* and *Telinga*, was lunar with intercalations of one month in every thirty, and this was the ancient mode of reckoning also on *Java*, and is so still on *Bali*, as its name *Saca Warsa Chandra* distinctly implies.

It is still more remarkable with respect to the æra, to find the *Javanese*, and *Balinese*, agreeing precisely, with the more northern nations, of the *Deccan*, in reckoning the birth of *Salivana*, as it is known, that the latter differ by one year in their calculations from their southern neighbours.

In conclusion I shall add that the worship of Buddha, and of Siva, of the Linga, and Yoni, were if I am rightly informed the prevailing forms of religion in the *Deccan*, in the period when we suppose, the intercourse with *Java*, to have taken place: the former was persecuted and nearly superseded by the latter to which we may safely ascribe the downfal of the one on *Java*, as evinced by the striking decay of the arts which accompanied it and the triumph of the other on *Bali*, where as I have mentioned in a former essay, it is now the prevailing form of *Hindu'sm*.

Ayugyacarta May 1st 1816.

N. B. I should be wanting in candour, did I not acknowledge, the great assistance, I have received, in the compilation of this paper from the valuable Essay of Colonel McKenzie, in the volume of the Transactions of the Batavian Society.

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a pellations by which I have heard him destinguished are *Saca* or *Aja Saca* pronounced *Aja Soco*, according to the peculiar enunciation of the *Javanese* meaning. "*King Saca*" and *Ducal Wareh*, a name equivalent to "offspring of the waters" which I believe, as well as the former, one of the title, under which he is known in India.

X.

Descriptions of some rare Indian Plants, *by* N. Wallich, *Esq. Superintendent of the Botanic Garden, Calcutta.*

Read February 11, and June 3, 1818.

Hedyotis strictа. *Wall.*

ERECTA asperula, ramis elongatis subdichotomis nudis, foliis linearibus, stipulis truncatis fimbriatis pedunculis terminalibus longissimis ternis subpaniculatis, stigmatibus linearibus.

Habitat in montibus Napaliæ, inque Turraye huic vicinæ, vigens Martio-Mayo.

Herba gracilis, tenuis, strictа, pedalis sesquipedalisque, *radice* perenni longâ fibrillosâ albâ.

Caulis obsolete tetragonus, pubescens punctisque minutis elevatis scabriusculus. *Rami* oppositi subbrachiati, filiformes, erectiusculi, subcomplanati, semel bisve dichotomi.

Folia angustissima, glabra, pollicaria ad bipollicaria, internodiis longiora,

coſtâ ſubtus elevatâ, baſi definentia in ſtipulas breviſſimas vaginantes crenulatas dum juniores denticulis aliquot ſubulatis notatas; ſuperiora ſubulata.

Flores magni, extus purpuraſcentes, glabri, terni, cum ſolitario e dichotomiis, pedunculis elongatis gracillimis erectis inſtructi.

Calycis dentes lanceolati, erecti, acuti, baſi tubi adpreſſi.

Corolla hypocrateriformis. *Tubus* gracilis, ſtriatus, obſoletè tetragonus, ſemipollicaris, calyce multoties longior, apice levitèr ampliatus. *Laciniæ* oblongæ, obtuſiuſculæ, patentes, tubi dimidium æquantes.

Antheræ lineares, longæ, erectæ, cum laciniis alternantes, fauce inclusæ, filamentis capillaribus breviſſimis inſidentes.

Ovarium oblongum glabrum biloculare, loculis polyſporis ovulis ſepto utrinque incraſſato inſertis. *Stylus* brevis, glaber. *Stigmata* incluſa.

Capſula ſubglobosa, magnitudine piſi nigri, glabra; fuſca, placentis carnoſis, inferne ſepto utrinque adnatis.

Obſervation. This elegant plant which appears to me quite diſtinct from Hedyotis graminifolia, LINN. was firſt communicated to me by my eſteemed friend Mr. WILLIAM JACK, of the Honorable Eaſt India Company's medical ſervice, to whoſe liberal and valuable botanical communications I am indebted for deſcriptions, drawings, and ſpecimens of ſeveral intereſting plants, from the former of which the preceeding account has almoſt entirely been taken. I had it afterwards from Napaul whence my people ſent abundance of ſpecimens to me, under the names of *Goſhega Soah*.

I have retained the ſpecific name given by Linnæus to a ſpecies of *Oldenlandia* which has been aſcertained not to differ from his *Hedyotis graminifolia*, and I have placed my plant under the laſt mentioned genus on the authority of the illuſtrious preſident of the Linnean Society (ſee *Hedyotis* in *Rees' New Cyclopædia*) and that of my predeceſſor in the botanic garden at Calcutta, the late Dr. WILLIAM ROXBURGH, who in a note to Oldenlandia, in his

Mſs. Flora Aſiatica points out the apparent identity of theſe two genera.

Androſace cordifolia. *Wall.*

Villoſa, foliis ovato-cordatis obtuſis ſinuatis crenulatis ſcapis petiolos ſubæquantibus; umbellâ pauciflorâ involucris ſetaceis; calyce campanulato corollâ breviore, fructifero ampliato.

Habitat in ſylvis prope Katmandu Nepaliæ, vigens initio anni.

Nomen *Boolle Saah.*

Radix gracilis nigricans fibriloſa.

Folia plura, erecto patentia, regulariter ſinuata, lobis latis rotundato-acutis, baſeos approximatis, bi-tripollicaria, ſuprà rugoſula, pilis hyalinis geniculatis præcipue ad vaſorum tractus obſita, ciliata, ſubtus glabriora, venuloſa, coſtâ nerviſque alternantibus prominulis.

Petioli teretes, graciles, folium æquantes purpuraſcentes, baſi membranaceo dilatati, uti ſcapi umbellæque veſtiti villis copioſis longis rufeſcentibus.

Scapi plures, filiformes, erecti.

Umbella patens, pauciflora, radiis capillaribus pollicaribus. *Involucrum* conſtans bracteolis lineari-ſubulatis vix bilinearibus villoſis, pedicellos numero æquantibus.

Flores majuſculi.

Calyx obſoletè quinquangularis, fundo rotundato, laciniis quinque ovatis acutis ciliatis, patulis.

Corolla albida, utrinque villoſula. *Tubus* cylindricus calyce anguſtior medio vix dilatatus. *Faux* nuda, leviter contracta, flaveſcens. *Laciniæ* tubo breviores ſubobovatæ leviter retuſæ patulæ.

Filamenta breviſſima, laciniis corollæ alternantia. *Antheræ* erectæ medium tubi haud attingentia.

Ovarium ſubrotundum, glabrum, obſoletè quinque-ſulcatum, uniloculare polyſporum, ovulis placentæ centrali ſtipitatæ inſertis. *Stylus* capil-

laris. *Stigma* capitato-clavatum ſupra ſtaminibus parum elevatum. *Capſula* rotundata, fundo calycis perſiſtentis globoſo recondita, baſi ſtyli coronata, vertice dehiſcens in valvulas quinque ovatas acutas. *Semina* plurima, minuta, fuſca, aſperula, ſubrotunda, inſerta placentæ globoſæ palcaceo-villoſæ pedicellatæ.

Obſervation. The opinion of Dr. F. HAMILTON (late BUCHANAN,) and Sir J. E. SMITH, relative to *Androſace rotundifolia* (*Exot. Bot.* 2. *p.* 113) applies with equal force to this pretty little plant; both are belonging to Androſace, to which genus *Cortuſa Gmelini* ought alſo to be referred, as has been remarked by GÆRTNER and LAMARCK. The affinity between the latter and my plant is very great. All its parts, eſpecially the footſtalks and calyces are beſet with long very ſoft, tranſparent, beautifully articulated hairs, which frequently have a reddiſh or purpliſh tint. The leaves are ſaid to poſſeſs a diſagreeable ſmell when freſh.

Primula prolifera. *Wall.*

Glaberrima, nuda, foliis oblongis ſubſpathulatis obtuſis dentatis petiolatis, ſcapo longiſſimo, floribus umbellatis demum verticillatis, bracteis linearibus ſ. foliaceis diſformibus.

Habitat in montoſis propc Sylhet Bengalæ orientalis ubi floret a Februario uſqve ad Aprilem,

Planta omnibus partibus glabra, farinaque carens.

Radix conſtans fibris craſſis cylindricis cornoſis rubicundis, radiculas capillares breves exſerentibus,

Folia erecto-patentia, æate obovata, argutè denticulata, valde obtuſa, ſuprà leviter convexa, ſubtus coſtâ magnâ nerviſque prominentibus notata, deorſum attenuata in *petiolum* latum canaliculatum marginatum; ſpithamea ad dodrantalia et ultrà.

Scapus gracilis teres erectus, foliis fere duplo longior.

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Primula prolifera

Grenchand del

Umbella terminalis, denſa, mox poſt antheſin, elongatione caulis ſenſim mutata in verticillos duos, tres quin quatuor multifloros, inferiores remotiuſculos pollicem duoſve diſtantes.

Bracteæ plures ſubulatæ ſ. lineares, pedunculis parum breviores baſi gibboſo-dilatatâ connatæ; nunc infra verticillum inferiorem difformes foliaceæ lanceolato-ovatæ, acutæ, undulatæ, crenulatæ, ipſum verticillum longitudine æquantes.

Flores in ſingulo verticillo viginti v plures, erectiuſculi, flavi, fragrantiſſimi, pedunculis inſidentes erectiuſculis gracilibus ſeſquipollicaribus, raro ad medium bracteolâ parvâ munitis.

Calyx tubuloſus baſi obſoletè quinquangularis; laciniæ lanceolatæ, acutæ dorſo convexæ.

Corolla hypocraterifomis. *Tubus* calyce duplo v triplo longior, cylindricus, decemſtriatus, ſurſum leviter ampliatus. *Limbus* planus, laciniis obcordatis crenulatis baſi contractis, ſinu acutangulo integerrimo. *Faux* contracta, notata tuberculis quinque minutis bilobis.

Ovarium globoſum. *Stylus* breviſſimus. *Stigma* ſubcapitatum.

Filamenta ſubulata, ſupra baſin tubi inſerta. *Antheræ* erectæ, oblongæ incluſæ.

Capſula ſubglobboſa ſtylo perſiſtente coronata; matura haud viſa.

Obſervation. For this valuable *Primroſe* I am indebted to the induſtry and ſucceſs of my aſſiſtant at *Sylhet*, Mr. M. R. SMITH, who ſent plants to the botanic garden towards the cloſe of 1817, producing abundance of elegant and ſweetly perfumed flowers the next February. I have no doubt that this ſpecies as well as the not leſs deſirable *P. denticulata* of Sir J. E. SMITH, (*Exot. Bot.* 2. *pag.* 109) which I have received both from *Sylhet*, and *Nepaul* and which has alſo bloſſomed freely this year, may be cultivated with facility and propagated from their fleſhy roots, which poſſeſs the ſmell of aniſe peculiar to ſeveral members of this genus.

The only ſpecies with which this elegant plant may be confounded is *Primula verticillata*, Forſk. flor. arab. 42, figured by my venerated preceptor, the late profeſſor M. Vahl in the 1ſt vol. of his *Symb. bot. tab.* 5. In the following particulars, however they differ ſufficiently to be eaſily diſtinguiſhed. My plant is perfectly ſmooth and has no tendency whatever to become mealy. Its leaves are oblong and rounded at their end, and their border finely denticulated. The whorls are many flowered with erect or adpreſſed bracles, which vary in their form, but generally are leafy in the loweſt and linear in the others. The flowers are at firſt collected in a terminal umbel, ſoon after they have expanded the ſtalk ſhoots up from their centre, and is terminated by another umbel. In this manner three or four ſucceſſive umbels become as many verticils. The corolla ſeems to be altogether larger; and the crenulated margins of its border wanting in *P. verticillata*.

Campanula ſtricta. *Wall.*

Aſpera pilis brevibus rigidis, caule gracili erecti ſubdichotomo, ramis ſimpliciuſculis ſtrictis, foliis liniaribus integerrimis ſeſſilibus, mediis approximatis, calycibus ſubpaniculatis priſmatico-turbinatis tubum campanulatum ſubæquantibus, coroliis puberulis, laciniis lanceolatis, capſulis poris iex ad baſin dehiſcentibus.

Habitat in pratis prope Katmandu, florens initio anni.

Nomen vernaculum *Nauſa Soah.*

Planta pedalis baſi ſimplex, medio ramoſus, omnibus partibus a pilis copioſis albicantibus aſpera.

Folia ſeſſilia, ſparſa, bipollicaria, anguſtiſſima, leviter undulata, erectiuſcula, ciliata, baſi anguſtata, utrinque piloſo-aſpera, ſubtus coſtâ nerviſque aliquot prominulis albicantibus.

Flores terminales subpaniculati majusculi, campanulati, cœrulei.

Pedunculi capillares elongati ad basin bracteolâ subulatâ muniti.

Calyx nervoso-angulatus, laciniis erectis lanceolatis acutis.

Corollæ tubus amplus *limbo* patente subcrenulato.

Stamina brevia. *Stigma* trilobum, lobis teretibus crassis patulis, *stylo*que pubescentibus.

Capsula tres lineas longa, inter nervos baseos poris inæqualibus dehiscens.

Observation. This species approaches to *C. gracilis, Forst.* differing however in its bell-shaped corol, the singular dehiscence of its capsule and the entire leaves.

Campanula pallida. *Wall.*

Hirsuta, foliis lanceolatis serratis subpetiolatis, caule ramoso, pedunculis longissimis terminalibus subpaniculatis, laciniis calycis corollam campanulatam fere æquantibus.

Habitat in Napalia ad loca sterilia. Floret cum præcedente.

Erecta, pedalis bipedalisque, omnibus partibus obsita pilis densis canis patentibus.

Radix lignosa, gryisea.

Caulis teres, angulosus, subflexuosus, basi ramosus. Rami graciles alterni, simplices, subfastigiati.

Folia alterna, patentia, lanceolata, utrinque acuta, crenato-serrata, pollicaria v. sesquipollicaria, basi attenuata in petiolum brevem marginatum, utrinque pilis densissimis cavis mollibus vestita. Superiora s. *floralia* linearia, eroso-dentata, unguicularia.

Flores terminales caulis ramularumque, solitarii, pedunculati, albidi, paniculam formantes tenuem, terminalem, subfastigiatam.

Pedunculi filiformes, pollicares bipollicaresque, teretiusculi, nudi s. medio folioio lineari stipati erecto-patentes, calycesque pilosi.

Calyx turbinatus, quinqueangularis, laciniis patentibus lanceolatis valde acuminatis corollam fere æquantibus.

Corolla campanulata ſtriata extus piloſa, laciniis lanceolatis acutis.

Filamenta ſubulato-capillaria e baſi triangulari incurvatâ ciliatâ; *antheræ* conniventes elongatæ, lineares, apice filamenti denudatâ terminatæ, ſaucem haud attingentes.

Ovarium vertice glabrum. *Stylus* pubeſcens. *Stigmata* tria ſubulata recurvata.

Obſervation. I poſſeſs ſpecimens of a plant, which probably is only a variety of this ſpecies, with radical and lower leaves oblong lanceolate dentate, purpliſh on the under ſurface; the upper ones linear-lanceolate, two inches long and remotely denticulated or almoſt entire; flowers pale blue. They were alſo collected in the fields near *Katmandu*.

Lobelia pyramidalis. *Wall.*

Lævis, caule erecto paniculato, foliis lanceolatis attenuato-acuminatis ſerrulatis, floralibus linearibus, racemis paniculatis foliоſis, laciniis calycinis corollam æquantibus.

Habitat in Napalia et Bengala orientaliflorens menſibus anni prioribus. Nomen Kaſianum *Atia chao*.

Planta herbacea lævis, erecta, tri-quadripedalis folioſa, caule ramiſque foliorumque marginibus plerumque violaceis.

Caulis teres, craſſus, medullaſus, angulis aliquot obtuſis e ramulorum inſertione decurrentibus notatus, baſi ſimplex, ſurſum ramulis axillaribus copioſis erecto-patentibus paniculatis ſimplicibus.

Folia ſeſſilia, ſparſa, patentia, elongata lanceolata ſerrulata, in acumen gracile attenuata, baſi anguſtata, tenuia, coſtâ ſubtus elevatâ, nerviſque arcuatis, rediculato-venoſa; inferiora dodrantalia et

ultra, medii caulis angustiora brevioraque, 4-6 pollicaria; suprema lineari angustissimè acuminata, bipollicaria

Racemi terminales ramulorum omnium caulisque, paniculati, multiflori, ol longi, folioſi.

Pedunculi ſparſi, approximati, patentes, filiformes, unciales, baſi ſuffulti folio lo florali ſ. *bracteâ* lineari filiformi ſubintegerrimâ, ipſum longitudine p ul › ſuperante.

Flores albi vel pallide violacei, odorati.

Calyx oblongus, laciniis lineari filiformibus longiſſimis.

Corolla baſi ſubtubuloſa, ſecunda, juxta totam longitudinem fiſſa, intus puberula, laciniis ciliatis, tribus intermediis lanceolatis, lateralibus duabus linearibus profundius ſeparatis.

Filamenta diſtincta, linearia, ciliata. *Antheræ* violaceæ in tubulum apice incurvum cohærentes dorſo pilis aliquot veſtita, inferiores duæ faſciculo pilorum terminata.

Ovarium biloculare. *Stylus* filiformis. *Stigma* puberulum bilobum ſubexſertum.

Obſervation. In the beginning of 1816 I received for the firſt time ſpecimens of this elegant *Lobelia* from my aſſiſtant Mr. Smith at Sylhet: and in the beginning of 1818 I had abundance from Napaul. Its racemes are numerous and leafy and give the plant a very gay appearance.

Lobelia begonifolia.—*Wall.*

Repens villoſa herbacea, foliis brevè petiolatis ſubrotundo-cordatis dentatis baſi inæqualibus, pedunculis axillaribus unifloris folium ſubæquantibus ebracteatis, laciniis calycinis linearibus acuminatis, medio vel baſi 1-v-2 dentatis corollæ tubo paullo longioribus.

Habitat in agris prope Katmandu, vigens Aprili, Maio.

Nomen *Toſhephoga.*

Caulis elongatus teres proſtratus laxus, ramique radicantes apicibus leviter aſſurgentes graciles ſimpliciuſculi, uti tota planta obſiti villis brevibus molliſſimis canis hyalinis.

Folia alterna ſubbifaria, pollicaria vel infra lobis boſeos rotundatis inæqualibus altero interdum obliterato acutè et groſſè dentata præcipue extrorſum, inferiora rotundato obtuſa, ſuperiora minora acuta, ſuprà glabriora ſubtus pallida ad vaſa villoſa, venoſo nervoſa.

Petioli vix ſemiunguiculares, ſuprá ſulcati, apice parum dilatati.

Pedunculi pauci, erecti, craſſiuſculi, folium ſubæquantes raro longiores.

Calycis laciniæ glabræ, attenuato-acumina æ.

Corolla coeruleſcens intus puberula, tubo fiſſo, limbo unilaterali, laciniis linearibus, lateralibus profundius ſeparatis.

Filamenta apice connatæ. *Antheræ* violaceæ imberbes, inferiores duæ pilo brevi cano terminatæ.

Ovarium oblongum medio leviter ventricoſum, glabrum. *Stigma* integrum villoſulum.

Capſula ſubrotunda, matura haud viſa.

Obſervation. This elegant ſpecies is eaſily diſtinguiſhed from all the others by its oblique leaves which in this reſpect are like thoſe of a *Begonia*. The ſtems are creeping to a conſiderable extent rooting at ſhort diſtances and ſending forth faſcicles of aſcending generally ſimple, from 6 to 10 inches long branches, ſome of which lay down again and ſtrike roots.

Uvularia parviflora. *Wall.*

Foliis oblongo-lanceolatis valde acuminatis petiolatis, pedunculis oppoſitifoliis elongatis apice bracteâ foliaceâ, floribus umbellatis infundibuliformibus, filamentis nanis antheris ſubæquantibus.

Habitat in nemoribus Napalia, vigens Aprili, Mayo.

Nomen Doola Soah.

Planta erecta debilis fæpe fruticibus vicinis ſuperincumbens, omnibus partibus lævis tripedalis v. orgyalis.

Radix horizontalis craſſa, emittens fibras copioſas carnoſas cylindricas.

Caules aliquot teretes nitidi glaucescentes erecti nudi infernè uſque ad digitum minimum craſſi, induti vaginis bipollicaribus membranaceis acuminatis laxis purpureo punctatis, ſupernè dichotomè ramoſi. *Rami* debiles hinc inde curvi foliosi ſubſimplices.

Folia oblonga in acumin longum gracile attenuata, baſi acuta, margine membranaceo aſperulo ad lentem denticulata, plana multinervia ſtriata ſexpollicaria, pollicem lata, ſuperiora anguſtiora.

Petioli vix ſemiunguiculares a decurrente folio marginati, plano ſulcati, baſi dilatatâ ſemiamplexante.

Pedunculi verſus ſummitates plures, erectiuſculi, bipollicares, angulati papilloſo-punctulati, infra apicem incurvam leviterque incraſſatam folio florali rameis ſimili inſtructi, ſexflori. *Pedicelli* filiformes, pollicares, umbellati ebracteati.

Flores cernui, e fuſco flaveſcentes, infundibuliformes vix ſemiunciales, profundè ſexpartiti, baſi contractâ protuberantiis ſex æqualibus brevibus gibboſâ. *Laciniæ* lanceolatæ, acuminatæ, extus carinatæ, intus planæ laeves baſi incraſſatæ excavatæ in tubulum breviſſimum: interiores tres paulo minores.

Stamina perianthii dimidium vix ſuperantia, inter ejus baſin et ovarium inſerta, recta. *Filamenta* breviſſima craſſa latiuſcula, antheris oblongis obtuſis baſi cordatis, parum brevioribus.

Ovarium triloculare ovatum, ovulis pluribus placentæ centrali adfixis. *Stylus* brevis craſſus. *Stigmata* tria cylindrica patula obtuſa, parum ſupra antheris elevata.

Uvularia umbellata. *Wall.*

Foliis ſubſeſſilibus ovalibus acutis, ſuperioribus lanceolatis acuminatis,

umbellis oppositifoliis brevè pedunculatis bracteâ foliaceâ instructis, pedicellis elongatis divaricatis, staminibus perianthium fere aquantibus, antheris filamento triplo brevioribus.

Habitat et viget cum antecedente cui radice caule ramisque similis, staturâ vero minor graciliorque.

Folia bi-tripollicaria brevissimè petiolata, inferiora basi rotundata, superiora lineari lanceolata, basi acuta.

Pedunculus umbellulæ brevis crassus valde incurvus subtus margine intermedio papilloso cristato interdum duplici notatus. *Pedicelli* bipollicares subdeflexi.

Perianthium flavum, cernuum, profundè sexpartitum, pollicare, basi angustatâ subtubulosâ gibberibus sex rugosulis, alternis (laciniarum interiorum) minoribus notatum, supernè ampliatum patens. *Laciniæ* lineari-cuneatæ, striatæ, acutiusculæ, subdenticulatæ, pilis brevibus argenteis adpressis conspersæ, leviter ciliatæ, basi angustatâ desinente in facculum brevem cujus margini adfixum est stamen.

Filamenta filiformia erecta. *Antheræ* ad faucem floris.

Ovarium turbinatum, breve. *Stylus* gracilis stamina æquans. *Stigmata* elongata patentia, hinc puberula, clavata, supra antheris elevata.

Observation. This species seems to differ from U. chinensis. (Bot. Mag. Vol. xx. 916) in having yellow long peduncled flowers placed in spreading umbellets opposite to the insertion of the leaves; in the segments being narrower and slightly pubescent, and the stigma raised above the long stamina.

I am in possession of a third apparently different plant, which from want of complete specimens I am not able at present to determine satisfactorily.

Convallaria oppositifolia. *Wall.*

Caule tereli, foliis oppositis petiolatis ovatis v. oblongis acuminatis glabris, pedunculis axillaribus nutantibus multifloris, perianthiis infundi-

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Convallaria oppositifolia

Gerachand del. Rainnaut

buliformibus.

Habitat in montibus Bengalæ orientalis, etiam in Napalia.

Nomen khaſianum, *Kattia Sekuria*.

Radix perennis, magna, carnoſa, conſtans nodis pollicaribus ovatis ſ. rotundatis lævibus, vertice faveâ notatis amplâ duplici, deorſum fibras copioſas craſſas aliaſque capillaceas emittentibus.

Caules ex eadem radice numeroſi obliquè adſcendentes ſ. inclinati, triquadripedales, apice ſubnutantes, uti omnes plantæ partes laeves, nitidi, baſi leviter incraſſati, vaginati, punctis copioſis purpureis obſiti, teretes ſ. leviter compreſſi, firmi, craſſitie chiami ſcriptorii, obſoletè articulato flexuoſi. *Vaginæ* aliquot ad inferiorem partem caulis erectæ alternæ cylindricæ ſtriatæ purpuraſcentes ore obliquæ acutæ, emarceſcentes.

Folia adſcendentia, ſecunda, patentia, firma, ſubcoriacea, tri-quadripollicaria, in acumen gracile lineare attenuata, baſi acuta, margine ſubrevoluta, lucida, ſupra atroviridia juxta nervos ſulcata, ſubtus pallida 5 ad 7 nerviæ nervis alternis obſoletis, coſtâ elevatâ carinatâ. Juniora (turionum novellarum) decuſſatim oppoſita, lactiſſimè virentia.

Petioli breviſſimi, vix ſemiunguiculares, craſſi, ſuprà ſulcati.

Flores e latere inferiore caulis, i. e. illo foliorum oppoſito provenientes nutantes, inodori, albi, punctis purpuraſcentibus conſperſi, laciniis virideſcentibus.

Pedunculi axillares, ſolitarii, unguiculares, punctati, 3 ad 8-flori. *Pedicelli* gracillimi, clavati ſemipollicares, baſi mediove bracteolâ capillari incurvâ.

Perianthium apice leviter contractum, laciniis patentibus lanceolatis acutis, apice intus faſciculo villorum munitis.

Filamenta ſupra baſin perianthii inſerta, conniventia. *Antheræ* lineares ſagittatæ exſertæ, conum formantes acutum ſtigma includentem.

Ovarium oblongum, teres, triloculare, trifulcum, loculis polyfporis. *Stylus* filiformis fubclavatus. *Stigma* fubtrigonum villis plurimis hyalinis obfitum.

Bacca rubra, laevis, trifulca, magnitudine pifi, loculis tri-v. tetraſpermis. Coet. ut in Convallaria majali, Gaert. carp.. 1. 59. t 16.

Obſervation I am indebted for roots of this plant to the induſtry of Mr. SMITH. They produced new ſhoots in February 1818, which bloſſomed the next month. The elegantly formed arched and ſhining leaves and the pretty, drooping flowers add to the intereſt, which this plant cannot fail creating in thoſe, who have been delighted with the fragrance and beauty of its cognate *Lily of the valley* and *Salomon's Seal*. Its root is formed preciſely like that of the latter (Convallaria Polygonatum) and it partakes of its whole habit, while its oppoſite leaves, affording another inſtance of true petiols in this genus, ſufficiently diſtinguiſh it from that and all the other ſpecies.

I have ſince the abovementioned period received abundant ſupplies of roots ſeeds and ſpecimens from *Napaul* through the liberality of the Honorable Mr. GARDNER.

Convallaria cirrhifolia *Wall.*

Scandens; foliis verticillatis ſenis linearibus apice cirrhatis.

Habitat in Napalia ubi vocatur *Goobaſa*. Floret Aprili, ad Mayum.

Radix carnoſa, digitum circiter craſſa, nodis elongatis foveolatis.

Caulis uti tota planta laevis, leviter glauceſcens, teres, craſſitie calami ſcriptorii, attenuato-elongatus, quadripedalis, debilis ſimplex ſcandens, baſi nudus et purpureo-maculatus.

Folia lineam vel duas lata, pollices tres ad quatuor longa, ſtriata, ſcabra ſubtus elevatâ, cauli approximata, marginibus revolutis, baſi

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Coccollaria cirrhifolia

Burchard del.

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Fabincraſſata, apice attenuata in cirrhum brevem recurvatum filiformem ſemipollicarem; inferiora ſolitaria oppoſita ternave, reliqua diſpoſita in verticillos ſexfolios numeroſiſſimos internodiis longiores, ſuperiores valde approximatos.

Pedunculi axillares, tot quot folia, vel pauciores, teretes, ſemipollicares, nutantes, triflori. *Pedicelli* capillares pedunculos longitudine ſubæquantes, clavati, baſi vel infra medium inſtructi bracteolâ albâ capillaceâ deciduâ.

Flores penduli, albi,

Perianthium tubuloſum unguiculare, ſexcoſtatum, verſus faucem leviter contractum. Laciniæ ovatæ obtuſæ apice intus acervulo villorum terminatæ.

Filamenta infra baſin laciniarum inſerta iiſque oppoſita ſubulata breviſſima. *Antheræ* lineares, filamentis longiores ſubſagittatæ, parum exſertæ.

Ovarium teres ſubcylindricum triloculare, loculis bi-vel triſporis; *ovula* axi adfixa. *Stylus* filiformis. *Stigma* villis ſ. papillis hyalinis obſitum.

Obſervation. The only ſpecies to which this remarkable plant has any affinity is *Convallaria verticillata* from which, however, it is eaſily diſtinguiſhed at firſt ſight by the numerous many leaved verticils and the tendril at the end of each leaf.*

Daphne involucrata. *Wall.*

Capitulis axillaribus lateralibuſque pedunculatis erecto-patentibus involucratis, perianthiis ſericeo-villoſis, foliis alternis oblongo-lanceolatis

* Since the above deſcription was preſented to the Society I have got a copy of Redoute's Liliacees in which, Vol. VI. 315, there is a deſcription of *Polygonatum ſibiricum*. This ſpecies, which none of the botanical authors in my poſſeſſion quotes, is exceedingly like my plant; it ſeems however to differ in having few-leaved verticils and in the bracte being much larger.

petiolatis acuminatis, subtus glaucescentibus.

Habitat in sylvis montium prope Sylhet Bengaliæ orientalis, florens tempore frigido.

Frutex ramosissima.

Rami teretes, glabri, cortice castaneo nitente, aetate albicante.

Folia alterna, raro opposita, petiolata, integerrima, tri-quadripollicaria, basi acuta, coriacea, glaberrima, suprà nitidâ, costâ valde prominente nervisque copiosis subtransversalibus, reticulato-venosa.

Petioli brevissimi, suprà plano-sulcati.

Stipulæ ad folia primordialia subulata, pilosula, admodum caduca, nullo earum vestigio manente.

Capitula axillaria et lateralia in axillis foliorum præteriti anni, pedunculata, hemisphærica, erectiuscula, solitaria, rarius geminata, sex-ad decemflora.

Pedunculi pollicares vel infrà, filiformes, graciles, incrassato-clavati, villosi, basi muniti bracteolis aliquot subulatis deciduis.

Involucrum caducum, purpurascens, diphyllum. *Foliola* ovata, obtusa, concaviuscula, semiunguicularia, integerrima, pubescentia, intus sericea, striata, æstivatione florum capitulum omnino includentia.

Flores sessiles, albi, suaveolentes.

Perianthium hypocrateriforme, gracile, semipollicare, extus villis densissimis adpressis fericeis intus glaberrimum, marcescens limbo patente quadrifido; *laciniæ* lanceolatæ, acutæ, imbricantes: duæ oppositæ minores, æstivatione inclusæ. *Faux* nuda pervia.

Stamina octo, erecta, seriebus duabus tubo inserta; superiora quatuor subexserta, laciniis opposita; inferiora iisdem alternantia in medio tubi. *Filamenta* capillaria, brevissima. *Antheræ* lineares s. oblongæ, utrinque longitudinaliter dehiscentes, biloculares.

Pistillum brevissimum, quartam perianthii partem haud excedens. *Ova-*

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...ishnupessaud del. *Daphne cannabina Lour ?* Hasenaut sc.

rium oblongum, basi nectario membranaceo cylindrico truncato integerrimo cinctum, supernè villis longis erectis barbatum, uniloculare, monosporum, ovulo vertice adfixo. Stylus filiformis villis ovarii occultus, iisque vix longior, leviter tortuosus. Stigma magnum, capitatum, cornosum, luteum, rugulosum, vertice retusum.

Observation. Specimens of this handsome shrub were sent to me in 1815 from Sylhet, by Mr. M. R. Smith, who informs me that a very good and durable kind of hemp is prepared of its fibrous bark. With the exception of their being permanently erect, the heads of flowers agree well with Sir J. E. Smith's excellent description of those of Daphne pendula. Plant. ined. fasc. ii. 34.

Daphne cannabina Loureir?

Floribus aggregatis terminalibus sessilibus bracteatis, perianthiis pubescentibus, foliis lanceolatis sparsis sessilibus, retusis vel acutiusculis.

Daphne cannabina, umbellis terminalibus, foliis lanceolatis oppositis. Loureir. cochinch. ed. Willd. i. 291. ?

Habitat in montosis *Hindostaniæ* meridionalis, e *Napalia* usque ad provinciam *Kamaon*, florens Decembre ad Martium. Fructus maturescunt mensibus Aprili et Maio.

Nomen *Set-Burooa*. Nepalensibus. *Bhulloo-Soang*.‡

Frutex sex-ad octopedalis, ramosissima, ramis sparsis rigidis teretibus, cortice pallido glabro rugoso, intus fericeo-fibroso.

Folia approximata, subcoriacea, lanceolata, s. oblongo-lanceolata, utrinque attenuata, apice sæpissimè retusa, interdum acuta, tri-quadripollicaria, glaberrima, atroviridia, suprà nitida, subtus opaca, costâ elevatâ nervisque gracillimis sublongitudinalibus, interdum obsolete et remotè crenulata.

‡ I understand from Mr. Gardner that *Soang*, *Soan*, and *Sua* are synonymous terms in the language of *Napaul*, and signify "flower."

Flores majuſculi, albi, fragrantiſſimi, duodecim circiter congeſti in capitulum terminale, ſæpe (ut jam monuit Cel. J. Sims, ſub Daphne adora, Botanical Magazine, vol. xxxviii 1587) apice rami elongatâ pubeſcente pedunculatum, ſuffultum bracteis (foliis tenellis?) lanceolatis acuminatis glabris unguiculatibus.

Perianthium tubuloſum, extus pubeſcentiâ copioſâ fericeâ obſitum, tubo cylindrico unguiculari, receptaculo dilatato tuberculato pubeſcenti ſubadnato; limbo patentiſſimo quadripartito, laciniis ovatis ſubretuſis vel lanceolatis acutis. Faux pervia.

Stamina ut in priore. Series ſuperiorum ſupra faucem elevata.

Piſtillum læve. *Ovarium* oblongum baſi circumdatum annulo obſoleto angnſtiſſimo carnoſo ſublobato. *Stylus* et *Stigma* præcedentis.

Drupa ovato-oblonga, acuta, glabra, rubra. *Putamen* tenuiſſimum, ſubmembranaceum, pallidum.

Semen globoſum, album.

Radicula conica, faveolæ baſeos cotyledonum leviter immerſa. *Plumula* punctiformis.

Cætera ut in *Thymelaea Mazereo*, Gærtn. carp. I. 188. tab. 39.

Obſervation. Among the extenſive and conſtant ſupplies of plants and ſeeds from *Napaul* which the botanic garden owes to the liberality of the Honorable Edward Gardner, Reſident at *Katmandu* are alſo ſpecimens and plants of the Paper-ſhrub, which I am informed by that gentleman grows very commonly in that country, and when in flower is exquiſitely fragrant. It appears there are two varieties, one with perfectly white the other with reddiſh flowers; both are uſed for ornament and for the manufactory of Paper, of which I am enabled to preſent to the Society's Muſeum ſpecimens of various dimenſions and texture. The common kind meaſures generally about two feet ſquare. The fineſt kind meaſures ten feet in length by 4 feet in breadth; and is manufac-

tured chiefly in *Dotee*, a province to the eastward of *Kamoon*. It approaches in softness and fine to that which is made in *China*, and it is not improbable that some of the latter may be produced from the same material. Loureiro mentions that paper is manufactured in the neighbouring kingdoms of *Cochinchina* from the bark of his *D. cannabina* which seems to differ only in having opposite leaves: a circumstance which may perhaps be owing to culture. It comes extremely near to *D. adora* of Thunberg and *D. indica* of Osbeck, which (at least that described in the *flora cochinchinensis*) Dr. Sims with great propriety suggests may be only a variety of the former. The question respecting the identity or difference of these three plants can be settled only by those, who have the means of comparing specimens of them.

I am indebted for an account of the manner of preparing the paper from the bark of this charming shrub, and for some parts of the description given above, to the communications of Lieut. H. R. Murray, and to the following notes extracted from the official correspondence of that gentleman with the Military Board at Calcutta.

"The *Set-burooa* or Paper-shrub is found on the most exposed "parts of the mountains, and those the most elevated and covered "with snow, throughout the province of *Kamoon*. In traversing "the oak forests between *Bheemtah* and *Ramgur*, and again from "*Almora* to *Chumpawat*, and down towards the river, it has come "under the immediate observation of the writer of these com-"munications that the *Set-Burooa* or Paper-plant only thrives "luxuriantly where the oak grows; so that it is not likely that "it will succeed in the plains. It is hardy and attains a height "of 5 to 6 feet; blossoming in January and February, and ripen-"ing its acrid red fruit about the end of April. The paper pre-"pared of its bark is particularly calculated for cartridges, being

" ſtrong, tough not liable to crack or break, however much bent " or folded, proof againſt being moth-eaten, and not in the leaſt " ſubject to dampneſs from any change in the weather; beſides, " if drenched or kept in water for any conſiderable time, it " will not rot. It is invariably uſed all over *Kamoon*, and in great " requeſt in many parts of the plains, for the purpoſe of writing " *Nuſubnamees* or genealogical Records, Deeds &c. from its ex- " traordinary durability. It is generally made about one yard " ſquare, and of three different qualities. The beſt ſort is re- " tailed at the rate of 40 ſheets for a current rupee, and at whole- " ſale 80 ſheets. The ſecond is retailed at the rate of 50 ſheets " for a current rupee and 100 at wholeſale. The third of a much " ſmaller ſize, is retailed at 140 ſheets, and wholeſale 160 to 170, for " the rupee. The following is the very ſimple proceſs of manufactur- " ing this paper. After ſcraping off the outer ſurface of the bark, " what remains is boiled in fair water with a ſmall quantity of " the aſhes of the oak, a moſt neceſſary part of the ingredients, " which has the effect of cleaning and whitening the ſtuff. Af- " ter the boiling, it is waſhed and immediately beat to a pulp " with ſmall mallets on a ſtone, ſo that when mixed up in a vat " with the faireſt water, it has the appearance of flour and water. " It is then ſpread on moulds or frames made of common bamboo " mats."

Daphne Gardneri. *Wall.*

Capitulis lateralibus pedunculatis fericeis maximis exactè globoſis, perianthii laciniis ſubrotundis, interioribus crenulatis, ſtigmate acuto oblongo, foliis lanceolatis acutis petiolatis, ſubtus villoſis.

Habitat in montibus Napaliæ, ubi floret vigetque initio anni.

Nomen vernaculum *Chuckmaree Soah.*

Daphne Gardneri

Frutex orgyalis, ſtaturâ et habitu antecedentis, ramis copioſis teretibus fuſcis pubeſcentibus, junioribus leviter angulatis villoſis.

Folia ſparſa, utrinque acuta v. ſubacuminata, 4 ad 5-pollicaria, pollicem circiter lata, integerrima, ſuprà glabra, ſubtus obſita pilis molliſſimis longis adpreſſis, præſertim juxta vaſa glanceſcentia, coſtâ nerviſque brevibus prominentibus albicantibus. Tenella uti capitula tomento veſtita fericeo molliſſimo denſiſſimo.

Petioli villoſi, ſemiunguiculares, ſuprà ſulcati.

Flores ſubcarnoſi flavi fragrantiſſimi, pollicares, extus capioſiſſimè et denſiſſimè villoſi, intus laeves, ſeſſiles, quinquaginta circiter congeſti in capitula ad ramulos lateralia, erecto-patentia demum nutantia, globoſa, diametri ſeſqui-ſel bipollicaris, baſi cincta involucro octo-v. decemphyllo emarceſcente deciduo intus fericeo, foliolis lanceolatis acuminatis unguicularibus, reflexis et a floribus occultis.

Pedunculus ſubcomplanatus, pubeſcens, clavatus, ſtriatus, ſublignoſus, pollicaris v. ſeſquipollicaris apice valde tumidus et intra involucri foliola elevatus in receptaculum ſemigloboſum craſſum faveolatum villoſum.

Perianthii tubus amplus cylindricus pallidus baſi apiceque leviter contractus, rectus. *Limbus* patens, laciniis obtuſis, interioribus (i. e. illis æſtivatione reconditis) inæqualiter crenulatis.

Antheræ ovatæ, utrinque juxta totam longitudinem dehiſcentes: ſeries ſuperiorum ſupra faucem perviam exſertæ.

Ovarium obovatum, ſuperne denſiſſimè barbatum, baſi cinctum annulo membranaceo crenulato anguſtiſſimo *Stylus* filiformis, pubeſcens. *Stigma* ſubcylindricum, acutum, carnoſum, ſtylo longius, vix ad inferiorem antherarum ſeriem elevatum.

Obſervation. Nothing can exceed the beauty and fragrance of this lovely ſhrub, which I lately received from, and which I have the greateſt ſatisfaction in naming after its diſcoverer, the Honorable

Edward Gardner, of whoſe invaluable botanical communications I have already had ſeveral occaſions to ſpeak before this learned Society. It is owing to the ready and moſt liberal compliance of that Gentleman with my wiſhes that I have been enabled to ſend two of my people to *Napaul*, under the ſanction of Government, for the expreſs purpoſe of collecting plants, ſeeds and preſerving ſpecimens for the Honorable Company's Botanic Garden at Calcutta; and it is to the protection and aſſiſtance he has invariably granted to them in their excurſions in that novel country, as well as to his own individual reſearches, that I have to attribute the frequent and extenſive additions which ſince September 1817 have almoſt daily been made to the riches of this inſtitution, forming a memorable and important Æra in its annals. Among the many uſeful and ornamental vegetable productions thus received, this new and diſtinct ſpecies of *Daphne* ſtands foremoſt. I am informed it grows to be a large ſhrub and is cultivated extenſively about *Katmandu*, both on account of its beauty and perfume, and alſo on account of the utility of its bark, affording a material of which a ſuperior ſort of paper is made in *Napaul*. The proceſs of this manufactory, as well as the eſſential qualities of the paper, of which I have the ſatisfaction to preſent muſters to the Society, does not differ from thoſe of the other ſpecies.

Andromeda lanceolata. *Wall.*

Fruticoſa, racemis terminalibus baſi folioſis ſecundis brevibus ſimplicibus, corollis ſubovatis, filamentis ciliatis *apice* ſagittatis, antheris muticis biporis, foliis lanceolatis utrinque acutis integerrimis, ſubtus puberulis.

Habitat in montoſis Bengalæ orientalis ubi floret nitio anni.

Nomen Khaſianum *Kattia-atianga.*

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Andromada ovalifolia

Rami rigidiuſculi; juniores incano-villoſi.

Folia ſparſa, approximata, pollicaria et ſeſquipollicaria, coriacea, ſupra laevia nitida, ſubtus vaſculoſa, nervis ſuboppoſitis longitudinalibus reticulatis; pubeſcentia; adultiora glabra.

Petioli vix ſemiunguiculares, pubeſcentes, ſuprà canaliculati.

Racemi terminales omnium ramulorum, rarius laterales, ſolitarii, cylindrici, bipollicares, baſi folioſi, pedunculo tereti angulato pedicelliſque unguicularibus puberulis.

Flores parvi, alterni, albi, cernui, pilis argenteis paucis adſperſi, bracteolâ lineari ad baſin pedicellorum.

Calyx urceolatus planiuſculus, coriaceus, laciniis lanceolatis.

Corolla calyce pluries longior ſubcylindrica fauce parum contracta, leviter angulata. *Laciniæ* breviſſimæ, ovatæ, acutæ patulæ.

Filamenta capillaria, villis longis obſita, baſi dilatata, infra apicem utrinque inſtructa denticulo ſubulato deorſum vergente, inde ſubſagittata. *Antheræ* oblongæ, baſi emarginatæ, *apice* poris binis obliquis dehiſcentes.

Ovarium ſubovatum quinqueſulcatum. *Stylus* longitudine circiter ſtaminum, *Stigma* clavato-truncatum.

Capſula ferruginea magnitudine ſeminis piperis nigri, coſtis quinque dilutioribus elevatis ad commiſuras valvarum. *Semina* plurima.

Andromeda ovalifolia. *Wall.*

Arborea, racemis lateralibus ſubterminalibusque elongatis foliis longioribus ſimplicibus, conjugatiſque attenuatis ſecundis, corollis cylindricis, filamentis ciliatis *apice* ſagittatis, antheris muticis biporis, foliis ovalibus integerrimis acuminatis ferrugineo-nervoſis.

Habitat in Napalia, florens capſuliſque onuſta Martio-uſque ad Jvnium.

Nomen *Sugechu* et *sheabogi*.

Ramuli teretes, nitidi, glabri, caſtanei, tenelli leviter compreſſi reſinoſo-

punctulati, pubeſcentes.

Folia approximata, patentia, ſparſa, coriacea, cuſpidulato-acuminata, baſi rotundato-acuta integerrima, leviſſimé undulata, magnitudine varia, tri-ad quadripollicaria, utrinque conſperſa pilis ferrugineis adpreſſis brevibus, præcipue juxta ramificationes vaſorum, nervis approximatis ſuboppoſitis reticulatim anaſtomoſantibus. Juniorum ramorum et floralia lanceolata, ſeſquipollicaria.

Petioli vix unguiculares, piloſuli, ſuprá canaliculati.

Racemi ſex ad octopollicares, adſcendentes, baſi foliis aliquot floralibus villoſis ſtipati. *Pedunculus* ſublignoſus, leviter angulatus, interdum punctis reſinoſis conſperſus. *Pedicelli* filiformes, unguiculares vel infrá villoſuli, baſi bracteolâ lanceolatâ patente deciduâ.

Flores copioſi approximati albi, magni, cernui, inodori, pilis argenteo-fulgentibus adpreſſis.

Calyx urceolatus, coriaceus, glabriuſculus, laciniis lanceolatis acutis patulis, nervoſis.

Corolla ſemipollicaris, leviſſimé quinquefulcata, baſi anguſtata, fauce parum contracta, laciniis ovatis acutis patulis.

Filamenta capillaria villis albis barbata, baſi dilatata, apice infra antheram utrinque dente patulo deorſum ſpectante, inde ſubſagittata. *Antheræ* ovato-oblongæ, muticæ, apice poro gemino obliquo dehiſcentes.

Ovarium glabrum, quinquecarinatum. *Stylus Stigmaque* ut in antecedente.

Capſula fuſca, ſubrotundo-quinquangularis, coſtis quinque faſciatis elevatis, magnitudine piſi mediocris. *Semina* numeroſa. Coet. ut in *A. calyculata*, Gaertn. Carp. I. 304. t. 63.

Obſervation. The leaves of this elegant tree vary conſiderably in ſize and form, from lanceolate to broad ovate, becoming almoſt cordate, more or leſs acuminate. They are of a firm and leathery texture, perfectly entire and without glands. The *arbutus* deſcribed by my eſteemed friend Colonel Hardwicke in his tour to *Siri-*

nagur (Asiat. Research. vi. p. 360. *A. herpeticus*, Mss. Coll. Roxb.) of which with his usual liberality I have been favored with the original drawing, is exceedingly like my tree. It differs however besides having a berry while the pericarp of mine is decidedly a capsule, in its leaves wanting the coloured rib, and the racemes being much shorter. Indeed if I could suppose the attribute of a Berry to have been founded on a slight mistake in the examination of the unripe seed vessel, I would venture to consider them as one and the same plant.

Since writing the above my esteemed friend Dr. Govan, Superintendent of the Botanic Garden at *Saharunpore* has favored me with the following observations on this interesting tree and with specimens which he gathered on the confines of *Chinese Tartary*.

" Your *Andromeda ovalifolia* occurs first on the hills between *Nahn* and *Subhatoo* at an elevation (by Barometer) of about 3000 feet, and continues to that of 8000 feet after which it becomes very rare and soon disappears entirely. It is called by the same name as the species of *Sirinagur*, *Ataar* or *Airee* and grows to a tree of 20 to 40 feet in height; the bark of the stem and older branches much cracked and rough, that of the former almost *suberose*. The middle rib of the leaf is coloured, sometimes *puniceous*; by drying both that and the nerves become ferruginous. With regard to its use the same opinion prevails here as in *Sirinagur*, an infusion of the bruised leaves in water being considered a specific against cutaneous complaints of an herpetic nature both in the human species and in cattle; its operation is said to be attended with considerable pain. Sheep and Goats eat the leaves which, when young, are said to produce soporific and deleterious effects on them * When used as litter they are said to destroy insects in the stalls of the cattle. Excellent timber is so plentiful where this tree is found that its wood is only used for burning."

* Mr. Gardner informs me that a similar notion prevails in Nepal.

"I send you specimens of a very marked variety if not a distinct species which, if adopted, I propose calling *A. cordata*. It grows intermixed with your *ovalifolia* and exposed to similar external circumstances, and yet it preserves constantly its distinguishing character which consists in its leaves being much broader in proportion to their length, almost always cordate at the base, of a considerably more leathery texture and always longer than the racemes. In other respects, in habit, size, native name and uses the trees correspond exactly."

Andromeda fastigiata. *Wall.*

Fruticulus repens adscendens, ramis tetragonis fastigiatis, foliis sessilibus quadrifariè imbricatis adpressis lanceolato-sagittatis lateribus revolutis dorso canaliculatis, floribus axillaribus solitariis subnutantibus campanulatis, filamentis *apice* sagittatis, antheris biporis pendulis.

E. Gossain—Than Napaliæ misit Dom. E. Gardner; e. confinibus Tartariæ chinensis G. Govan, M. D.

Nomen Napal. *Naba.*

Fruticulus palmaris ad dodrantalem basi nuda repens. *Rami* subopositi simplices, stricti, fastigiati, 2-ad 6-pollicares, villosuli teretes, propter foliola ubique imbricata tetragoni.

Folia decussatim opposita, coriacea, gibbosa, bilinearia, circumdata membranulâ ciliatâ apice in ligulam productâ, lucida, lateribus supra dorsum villosulum revolutis.

Pedunculi solitarii, uniflori, folio duplo fere longiores, subclavati, villosi, basi squamulis aliquot imbricatis ovatis.

Flos parvus, albus, nutans, glaber.

Calyx 5-partitus laciniis lanceolatis acutis membranaceo-marginatis.

Corolla calyce duplo longior, limbo 5 fido patenti, lacinis ovatis obtusis.

Filamenta capillaria apice aristis duabus descendentibus curvis capillaceis

antherâ ovatâ apice biporâ longioribus.

Ovarium depreſſo-globoſum, ſulcatum, nectario circumdatum annuliformi obſoletè crenato, baſes filamentorum adfigente. *Stylus* columnaris ſtaminibus parum longior.

Capſula globoſa calyce perſiſtente brevior, 5-locularis, 5-valvis.

Obſervation. This elegant ſmall ſpecies approaches to *A. ericoides*. It forms a compact adſcending ſhrub, which at firſt ſight may eaſily be miſtaken for a heath. The branches are exactly four-ſided, moſtly undivided, though ſometimes ſending forth one or two ſmall branchlets from their baſe; they are ſtraight and all of the ſame height. The leaves are of a dark green ſhining colour; when they become old they aſſume a browniſh hue and at length fall off, leaving the lower part of the branches and the whole creeping ſtem naked. They have a very peculiar conformation; the back being convex and gibbous with a deep longitudinal furrow owing to the ſides being turned backward over it. Their internal ſurface, or that which is cloſely adpreſſed to the branch is flat and ſurrounded with a thin ciliated or lacerated membrane which elongates at the apex of the leaf into a ſetaceous point covering the ſagittate baſe of that next above, and entering its dorſal furrow. Flowers few at the top of the branches, white, about four lines long, nodding.

Andromeda? formoſa. *Wall.*

Arborea, paniculis terminalibus racemoſis nudis, corollis ovatis ſecundis cernuis, filamentis pubeſcentibus, antheris utrinque longitudinaliter dehiſcentibus dorſo ariſtis duabus deſcendentibus, foliis oblongis acuminatis ſerrulatis.

Habitat in Napalia, florens cum præcedente.

Nomen Newar. *Sheabogee*; Parbutt. *Chemala*.

Arbor mediocris, ramis teretibus fuſcis laevibus cicatricatis ſubfaſcicu-

latis.

Folia verſus ſummitates valde numeroſa approximata, patentia quadriad ſex-pollicaria, coriacea, firma, utrinque glaberrima, in acumen gracile definentia, baſi acuta, margine incraſſato ferraturis parvis regularibus notata, ſuprà lucida, ſubtus coſtâ valde elevatâ craſſâ nervis copioſis gracilibus, veniſque pulcherrimè reticulatis.

Petioli craſſi, ſemipollicares, ſuprà ſulcati, ſæpe rufeſcentes vel ferrâginei.

Panicula terminalis et ex axillis foliorum ſupremorum, biſce duplo longior, erecta, pedunculata, ovata, denſa, conſtans racemis erectis ſubadpreſſis ſeſſilibus, ſparſis, cylindricis, digitum vix longis.

Pedunculi ſublignoſi, angulati pubeſcentes, leviter glauceſcentes. *Pedicelli* unguiculares puberuli, baſi ſuffulti bracteolâ lanceolatâ, adque medium duabus aliis minoribus.

Flores cernui, albi, inodori, glabri.

Calyx coriaceus, quinquepartitus, laciniis lanceolatis acutis, punctis reſinoſis adſperſis.

Corolla ampla, ventricoſo-ovata, calyce triplo longior, nitida, laciniis breviſſimis recurvatis ſubreniformibus obtuſis.

Filamenta craſſa, ſubulata, puberula, dimedium corollæ vix attingentia. *Antheræ* aurantiacæ, oblongæ, loculis apice baſique ſolutis, dorſo ſubgibboſo ad inſertionem filamenti utrinque auctæ ariſtis duabus capillaribus antheram dimidiam ſuperantibus arcuatis apice convergentibus,

Ovarium globoſum, laeve, baſi cinctum annulo carnoſo obſoleto. *Stylus ſtigmaque* priorum.

Obſervation. This beautiful tree comes near to *A. japonica* and ſome other ſpecies with panicled racemes, it differs however ſpecifically from them all. Its flowers are extremely copious forming denſe terminal bunches of an elegantly oval form. The leaves are of

Gaultheria fragrantissima

a peculiarly firm and leathery texture, beautifully reticulated below, with the margin finely ferrated from the very base almoſt to the end of their tapering point. They are perfectly ſmooth meaſuring an inch or an inch and a quarter in breadth.

It is not unlikely that this tree may prove to be a kind of *Arbutus*, the corol ſeeming to partake more of the character of that genus than of *Andromeda*. Not having yet ſeen the fruit I am unable to decide this queſtion.

Gaultheria fragrantiſſima. *Wall.*

Ramis flexuoſis, foliis ovato-lanceolatis ſerratis utrinque acutis ſubbifariis glabris ſubtus reſinoſo-punctatis, racemis exillaribus ſolitariis folia æquantibus ovariiſque incano-pubeſcentibus.

Habitat in Napalia; florens Aprili.

Nomen *Sheabongi*.

Frutex ramis rigidis fuſcis teretibus leviter angulatis, junioribus pubeſcentiâ incanâ veſtitis.

Folia alterna, interſtitiis duplo longiora, patentia, coriacea, firma, tripollicaria, lanceolata vel ovato-lanceolata, ſerrulata, marginibus ſubrevolutis, ſuprà lucida, ſubtus pallida punctis copioſis reſinoſis elevatis purpuraſcentibus notata, coſtâ ſub-carinatâ nervis inferioribus ſuboppoſitis totam fere folii longitudinem excurrentibus, reticulato-venoſa.

Petioli breviſſimi, craſſi, profundè ſulcati.

Racemi erectiuſculi ſeſſiles graciles multiflori pubeſcentes.

Pedunculus ſubflexuoſus; *pedicelli* teretes vix lineas duas longi baſi ſuffulti bracteâ lanceolatâ canaliculatâ patenti apiceque infra calycem aliis duabus oppoſitis ovato-cordatis amplexantibus concavis, acutis patentiſſimis.

Flores ſecundi, nutantes, ſuaveolentes.

Calyx ſubturbinatus laciniis ciliatis acutis patentibus.

Corol'a ſubovata, calyce duplo longior, leviter angulata, extus glabra, intus piloſula.

Filamenta planiuſcula, puberula, brevia. *Antheræ* ſubſeſſentes, erectæ, conniventes, loculis terminatis cornu copillaceo furcato.

Ovarium planum villoſum, circumdatum annulo carnoſo obſoleto ſublobato. *Stylus* columnaris brevis. *Stigma* obtuſum.

Obſervation. This elegant ſhrub agrees ſo well with the character and habit of *Gaulteria*, as they have been defined by the celebrated author of the *prodromus floræ Novæ Hollandiæ* vol. i. 558) that I heſitate not referring it to that genus. Not only the flowers but the leaves alſo partake of a very aromatic fragrance, which the plant retains a conſiderable time even after it has been dried; the plant might therefore be uſed at *Napal*, as *G. procumbens* is ſaid to be employed in *Canada*, as an improver of inferior ſorts of Tea. I have not yet had any opportunity of examining its fruit, which I am informed is eat by the Napaleſe.

Saxifraga ligulata. *Wall.*

Radice carnoſâ horizontali ſquamoſâ, foliis craſſis rotundatis ſ. obovatis breviſſimè petiolatis vaginiſque ligulatis ciliatis, ſcapo brevi unibracteato, paniculâ terminali furcatâ, petalis calyce duplo longioribus.

Habitat in montibus Napaliæ et Bengaliæ orientalis, florens Januario et Februario.

Nomen Khaſianum *Alia Torongſing*. Napalenſibus *Schanpe-Soah*.

Radix cylindrica, pollicem circiter craſſa, fuſca, intus lactiſſimè rufeſcens, pedalis et ultra, indiviſa, ligneſo-carnoſa, ſolida, obſita bracteis (rudimentis vaginarum) magnis nigricantibus irregularibus patentibus emarcidis, deorſum emittens fibras longas teretes ſubſimplices.

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Saxifraga ligulata

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Folia omnia radicalia, plana, terræ incumbentia, obtuſiſſima, indiviſa, baſi leviter anguſtata, ad inſertionem petioli retuſa, crenato-dentata, dentibus creniſque ciliis longis pallidis inæqualibus terminatis, palmatim ad pedalia, uti omnes plantæ partes laevia, carnoſa, ad lentem punctata, ſuprà ſaturatè viridia, dum juniora purpuraſcentia, ſubtus pallida, coſtâ valde robuſtâ latâque, nervis prominentibus ſubopoſitis furcatis, ad marginem reticulatis, avenia.

Petiolus valde craſſus, cylindricus, lineas duas ad ſex longus, inſertus dorſo vaginæ laxæ membranaceæ in ligulam magnam petiolo duplo longiorem erectam bilobam ciliato-barbatam deſinentis.

Scapus craſſus, cylindricus, ruſeſcens, pedalis, apice ſemel bifve furcatus.

Bracteæ ovata, acuta, adnata, ciliata, laxa, pollicaris, infra bifurationem ſcapi, decidua.

Flores magni, albicantes vel roſei, inodori, pedunculati, congeſti in paniculam terminalem compactam ſubracemoſam nudam leviter nutantem.

Pedunculi teretes, craſſi, ruſeſcentes; *Pedicelli* vix unguiculares.

Calyx ovatus coloratus, profundè quinquefidus; *laciniæ* ovatæ, obtuſæ, erectæ, leviter ciliatæ.

Petala ſubrotundo-ovata, unguicularia, baſi in unguem brevem anguſtata, calyci intus inſerta, laciniiſque ejus alternantia.

Filamenta ſubulata, calyci inſerta, patentia, quorum quinque petalorum longitudine laciniis calycinis oppoſita; quinque illis alternantia et breviora, petalis oppoſita. *Antheræ* ovatæ, erectæ, utrinque longitudinaliter dehiſcentes, rubicundæ.

Ovarium ſuperum profundè bipartitum, ſeu potuis ovaria *duo* oblongo-ovata convexa latere interiori plana lineâ longitudinali exſculpta, unilocularia, polyſperma. *Ovula* valde numeroſa adfixa placentæ oblongæ carnoſæ paginæ interiori lineæ iſtæ longetudinali correſpondenti inſertæ. *Styli* duo, longitudine filamentorum majorum, craſſi ſemiteretes, divaricato-patentes. *Stigmata* car-

noſa, ſubreniformia, mucoſa, viridia

Obſervation. I received this ornamental plant in the beginning of 1818 from Mr. EDWARD GARDNER, the Reſident at *Katmandú*, and from Mr. SMITH, my aſſiſtant at *Sylhet*. I have ſince had a great number of roots from both places which are thriving very well in the Botanic Garden at Calcutta.

There are, it appears, two varieties; one with almoſt pure white, the other with more or leſs pink-coloured bloſſoms, which gradually change into each other ſometimes even on one and the ſame plant, and which added to the large, ſhining thick-leaves give the ſpecies a very beautiful appearance. The young leaves are of purpliſh or browniſh colour and ſtand ſomewhat erect.

Blackwellia ſpiralis. *Wall.*

Foliis cuneiformi-obovatis, glanduloſo-dentatis, ſubtus pubeſcentibus, ſpicis axillaribus ſolitariis longiſſimis nutantibus, floribus ſubpentandris.

Habitat in Pegu. In horto botanico Calcuttæ floret menſibus Auguſto-Decembre.

Arbor magna, ramoſiſſima, trunco recto, cortice glabro cinereo deciduo. *Rami* longiſſimi, teretes, glabri, calloſo-punctati, penduli.

Folia alterna, ſubbifaria, petiolata, palmaria et majora, cuneiformia v. obovata, coriacea, apice rotundata cum acumine lato obtuſo, baſi attenuata, remoté et obtuſiſſimé dentata, ſinubus inter dentes incraſſatis glanduloſis, ſuprá glabra, ſubtus coſtâ nerviſque prominentibus pubeſcentibus.

Petioli craſſi, breviſſimi, pubeſcentes, ſuprá planí.

Stipulæ lanceolatæ v. lineares, caducæ.

Spicæ nudæ, indiviſæ gracillimæ cylindricæ, folia æqvantes, poſt defloratiopem elongatæ, nutantes, breviſſimé pedunculatæ, villis copioſis brevibus canis veſtilæ. *Rachis* teres, gracilis, ſublignoſa,

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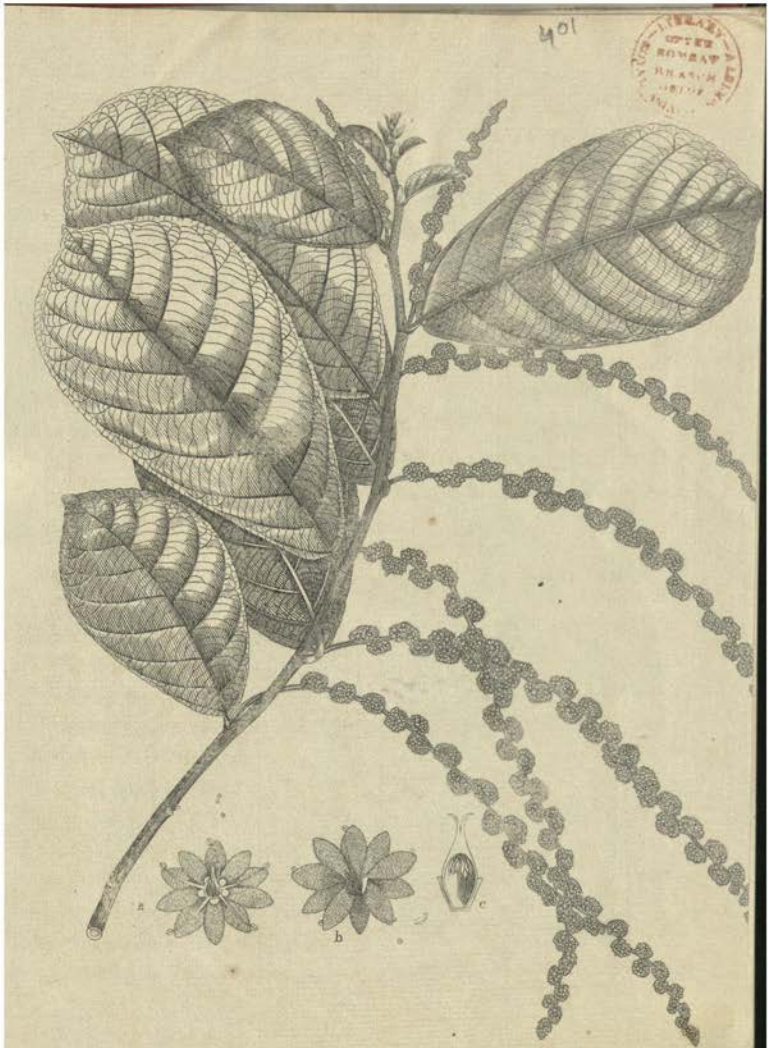


Blackwellia spiralis

ſpiralis.

Flores parvi, ſeſſiles, 6 ad 10 diſpoſiti in glomerulos denſiſſimos ſpiræ in modum circum rachin ordinatos elongatione ſpiræ remotiuſculos. *Bracteæ* parva lanceolata decidua infra omnes glomerulos, aliæque minutæ infra ſingulos flores.

Perianthium 10 v. 12-phyllum, patentiſſimum, radiatum; foliola minima, villoſa, ciliata, albicantia, acuta: exteriora 5 v. 6 linearia; interiora ſubſpathulata, illis parum latiora.

Filamenta 5 v. 6 glabra, capillaria, perianthio longiora, foliolis ejus interioribus oppoſita, patentia. *Antheræ* fuſcæ, ovatæ, didymæ, utrinque dehiſcentes, glabræ.

Nectaria tot quot ſtamina cumque illis alternantia, carnoſa, ſeſſilia, ſubrotunda, majuſcula, aurantiaca, villoſa.

Ovarium ſemiinferum, turbinatum, villoſum, intra perianthium ovato-acutum, angulatum, uniloculare, loculo magno lineis duabus vel tribus parietalibus notato, ovulis pluribus latcribus gregatim adfixis, cylindricis pendulis.

Styli duo, e baſi latâ intus ſulcatâ (perſiſtente?) divergentes, ſubulati. *Stigmata* minuta, globoſa.

Obſervation. This handſome tree ſprung up accidentally from earth which was received from *Pegu* in 1811, and has ſince grown to a conſiderable ſize, with numerous long and ſlender pendulous branches which it emits from the baſe almoſt of the ſtem. It has bloſſomed freely during the three laſt years without ſhewing any diſpoſition to produce fruit. In general habit as well as in the peculiarly fetid ſmell of the flowers it is exactly like *Ludia fœtida, Roxb. Mſs.* a ſpecies of *Homalium*, which the doubts of *Juſſieu, Willdenow* and the author of that article in Rees' new Cyclopædia ſeem to require ſhould be united with *Blackwellia*. The parts of the flower are in that tree more numerous and the ſtamens faſcicled. It has for many years bloſſomed abundantly without

once producing any fruit.*

Blackwellia tomentosa, Vent. which I know only from POIRET's Supplement to the Encycl. botanique. i. 640, seems to be a distinct species from that described above.

Clematis smilacifolia. *Wall.*

Scandens, foliis simplicibus ovato-cordatis, petiolis acirrhatis, racemis axillaribus paucifloris elongatis.

Habitat in montibus Bengalæ orientalis prope Sylhet, ubi vocatur *Boeghandi*; inqve Napalia. Floret initio anni.

Frutex volubilis, ope petiolorum scandens, omnibus partibus glaberrima, ramis gracilibus elongatis sulcatis striatis fuscis articulatis.

Folia opposita, longè petiolata, integerrima, acuta, quinquepollicaria ad palmaria, subcoriacea, quinquenervia, transversim reticulato-venosa.

Petioli teretes, graciles, suprà planiusculi, basi delatati, longitudine folii, hinc inde torti, absque ullis cirrhis.

Racemi oppositi, foliis duplo triplove longiores, floribus longè-pedunculatis oppositis majusculis.

Pedunculi striati; partiales quadripollicares, patentes.

Bracteæ infra singulum par pedunculorum oppositæ, lanceolotæ, subcuneatæ, semipollicares. Aliæ interdum infra medium singuli pedunculi partialis oppositæ, lineares, recurvatæ.

Perianthii foliola quatuor, patentia, demum reflexa, oblonga, acuta, [illegible] [illegible], extus ferrugineo-villosa, striata, intus glabra violacea.

Petala nulla.

* Since writing this Plate received specimens from *Napal* of a tree which, together with that described here, belong to *Homalinæ* and probably form two new species of *Astranthus* Lour, [illegible] Mr Robert Brown in Tuckey's narrative of the expedition to the river *Congo*, Append. p. 42[illegible]

Supervirens.

Menispermum Cocculus

Stamina numerosissima, patentia, filamentis apice subulatis nudis. *Antherarum* locula linearia, utrinquè adnata.

Pistillum copiosa, erecta, staminibus breviora, villoso-barbata, receptaculo elevato piloso insidentia.

Capsulæ numerosæ, fuscæ, compressæ, falcatæ, margine incrassatæ, sparsè pilosæ, apice incurvatâ sensim desinente in setam gracillimam bipollicarem plumosam.

Funiculus brevis, filiformis, apici loculamenti hinc applicatus. Cost: ut in *Clemati Vitalba*. Gærtn. Carp. i. 353 t. 74.

Observations. This species is sufficiently distinct from all its congeneres and requires no further detail. Its elegant leaves, the dark brown velvet perianth, and the numerous yellow stamens contribute to render it a very beautiful plant.

Menispermum Cocculus.

Perenne volubile et scandens, foliis cordatis, basi truncatis firmis lucidis. MSS. Gul. Roxburgii.

Natsjatam f. *Batta-Valli*, Rheed. Mal. VII. 1. tab. 1.

Tuba baccifera, Rumph. Amb. v. 35. tab. 22.

Tuba flava, ibid. 38 tab. 24?

Menispermum Cocculus. Linn. Mat med. n. 175. (exclus: synon. Pluckenetii) Gaertn. Carp. i. 219. tab. 70.

Menispermum lacunosum. Lam. Encycl. Bot. IV p. 98.

Menispermum flavescens. Lam. ibid?

Cissampelos Cocculus. Poiret. ibid v p. 9 (exclusis plurimis synon.)

Habitat in Malabaria; Amboina, Celebe, etc. In hortum botanicum Calcuttæ introductum a cel. B. Heyne. M. D.

Frutex magna s. potius arbuscula, volubilis et supra arbores ope basium petiolorum cirrhatorum latè scandens, ramosissima, frondosissima, sempervirens.

Radix craſſa, lignoſa, ramoſa; intus flava, lacunoſa; vetuſtior cortice ſuberoſo obtecta.

Truncus craſſus, cylindricus, cortice veſtitus ſuberoſo molli rimis plurimis parvis notato cinereo, baſi emittens ſtolones radicantes, plures orgyas longas, apice foliofas, tenellas purpuraſcentes. *Rami* longiſſimi, teretes, glabri, ſordidè gryſei, penduli; juniores uti omnes reliquæ partes laeviſſimi, pallidi, glauceſcentes.

Folia ſparſa, petiolata, patentia, ramulorum valde approximata, ampliſſima, dodrantalia et ultra, coriacea, firma, ſubrotundo-ovata, obtuſa v. acutiuſcula, apice cum mucrone deciduâ margineque integerrimo recurvatis, baſi leviter cordata, vel ſubtranſverſa, ſemper ad inſertionem petioli leviſſimè emarginata, ſuprà atroviridia lucida, inter vaſa in bullas latas tranſverſales elevata; ſubtus concava glauca, furfure parco adſperſa, ſeptem-v. quinquènervia, coſtâ baſi integrâ nerviſque extrorſum ramoſis valde prominentibus carinatis, venis gracilibus horizontalibus, ſinubus vaſorum, præcipue axillis nervorum glanduloſo excavatis, ad paginam inferiorem folii villorum acervulo notatis, ad ſuperiorem elevatis. Folia adulta, præprimis eorum vaſa flaveſcentia; juniora ovata, acuta, coloris lætiſſimè viridis.

Petioli graciles, teretes, lignoſi, ſuprà leviter ſulcati, folia longitudine aquantes, juniores duplo et plus breviores, apice incurvâ tumidi, baſi valde incraſſatâ pollicari varié hinc inde torti, cirrhati.

Stipulæ nullæ, nec earum veſtigium.

Inflorescentia foeminea. Racemi oblongi, laxi, penduli, numeroſi, 4 v. plures faſciculati, raro ſolitarii, ex ipſo trunco ramiſque vetuſtioribus, pedunculati, compoſiti, pedales bipedaleſque. *Racemuli* ſparſi, ſubſeſſiles digitum circiter long, cylindrici, patentiſſimi, nox adſcedentes (ratione pedunculi univerſalis recurvati.)

Pedunculus baſi nudus, teres, incraſſatus, extrorſum leviter anguloſus; partiales graciles, ſtriati: omnes ſubcarnoſi, laeves, lacteſcentes,

inſertione leviter intumeſcentes et ſubarticulati.

Flores ſparſi, albi, carnoſi, patentes, copioſi. *Pedicelli* teretes, craſſiuſculi, leneas duas longi, baſi mediogue bracteolâ unâ duabuſve minutis ovatis acutis emarceſcentibus inſtructi. Similes bracteolæ ad inſertionem racemuli fruguli, ui priores valde decidum.

Perianthium petaloideum, hexaphyllum, recurvatum, æſtivatione imbricatum; foliola lanceolata acuta duplici ordine diſpoſita, aqualia. Foliola alia 1-v. 2. rarius 3. minima, bracteiformia (calyx?) lato-ovata v. oblongata, obtuſa, baſi floris adpreſſa, hujus foliolis alternantia, cumque illis decidua.

Ovaria tria, rarius quatuor, erecta, ſubulato-ovata, dorſo gibboſa, contigua, perianthii foliolis interioribus alterna, hiſque breviora, unilocularia, monoſperma; *ovula* oblonga, teretia, ſurſum adfixa, pendula. *Stigmata* ſeſſilia, ſubulata, acuta, carnoſa, rugoſa, recurvata, mucoſa.

Nectaria ſ. rudimenta ſtaminum 8 v. 10. baſin ovariorum ambientia, patentia, carnoſa, cylindrica, truncata, inæqualia, minima.

Inflorescentia maſcula haud viſa.

Obſervation. The following is an extract from the late Dr. ROXBURGH's valuable manuſcript. "There is no figure in RHEEDE's or RUMPHIUS' "works which I can quote for this famous plant: nor indeed in any "book known to me, except that of GAERTNER and that extends "only to the fruit. It is a native of *Malabar*, from thence ſeeds "were ſent to the Botanic Garden at Calcutta in 1807. In 1812 "the plants reared from theſe were ſufficiently large to extend over "a conſiderable Mango tree, having ſtems as thick as a man's wriſt, "covered with deeply cracked ſpongy aſh-coloured bark: the "young ſhoots ſmooth and green. Leaves alternate, very exactly "cordate, entire, apex obtuſe or emarginate, of a hard texture, "lucid above, paler but no wiſe tomentoſe or villous underneath, "from 4 to 12 inches long, by 3 to 8 inches broad. I cannot ſay

"any thing of the natural character, as our plants have not yet "bloſſomed."

One of the four individuals alluded to in this extract bloſſomed for the firſt time towards the cloſe of 1816, and while I write this (in December of the following year) both that and another female ſomewhat ſmaller ſhrub are covered from the baſe of the ſtem along the principal branches with innumerable faſcicles of pendulous racemes, which give them a very ſtately appearance. The ſmell of the flowers ſpreads to a great diſtance and being very powerful is offenſive in the immediate vicinity of the ſhrub, not unlike that of the common *Berberry* and *Lawſonia*. The root is ligneous and very branchy, porous and of a deep yellow colour within, poſſeſſing a peculiar, ſtrong and naufeous ſmell, and like all the tender parts of the plant a bitter taſte. The principal branches of the root are covered with a ſpongy cracked bark. The circumference of the trunk meaſures at preſent between fourteen and ſeventeen inches. The old leaves eſpecially their ribs and nerves are yellowiſh.

The miſtake of POIRET in uniting *Ciſſampelos Pareira*, *Caapeba* and other plants with *Meniſpermum Cocculus L.* in the continuation of LAMARCK's Encycl. Botanique, v. p. 9. has been adverted to by the illuſtrious author of the articles *Meniſpermum* and *Ciſſampelos* in REES' new Cyclopædia.—Lamarck (l. c. iv. p. 96.) cites RUMPHIUS' *Tuba baccifera* with ſome doubt as a variety, or perhaps the female plant only of his *M. tuberculatum* (Roxburgh's *M. verrucoſum*, ſee FLEMING in Aſiat. Reſearch: xi. p. 171); and two pages further on, he forms it into a diſtinct ſpecies, which he calls *M. lacunoſum*, and which is the ſame as *M. Cocculus*. I am ſurpriſed that neither RHEEDE's nor GAERTNER's works have been quoted under this head. The ſame great botaniſt eſtabliſhes a ſeparate ſpecies on RUMPHIUS' *Tuba flava* and calls it *M. flaveſcens*,

(l. c. p. 98,) having previouſly remarked, with great propriety, that it comes very near to the *Tuba baccifera*. I have ventured to quote both theſe plants of RUMPHIUS as ſynonymes: becauſe though his deſcriptions of their flowers and fruits ſeem to differ, yet they agree perfectly in other reſpects and the leaves of the ſhrub which is deſcribed above, varying from almoſt orbicular obtuſe to ovate-cordate, more or leſs acute, unite in them the characters of both thoſe plants.

RHEEDE's figure of the leaves is a pretty exact repreſentation of thoſe of my plant; and agrees better with the deſcription in the *Herbarium Amboinenſe* than RUMPHIUS's own plates do, notwithſtanding the remark of this laſt mentioned author to the contrary.

I have not been able to identify this plant with the Sanſcrita name of it, *Cácámári*, given by Dr. W. AINSLIE, in his excellent *Materia medica of Hindooſtan*, pag. 81; nor have my hopes of ſucceeding in tracing the name *Coculus* to the Sanſcrita *Cácoli* and *Kacola* been realiſed; one of theſe latter belonging to an innoxious bulbous root, the other to an aromatic fruit, which certainly is *not* that of the plant in queſtion. My worthy friend, the Reverend Dr. WILLIAM CAREY, informs me that one of his pundits, a native of *Malabar*, to whom he ſhewed the fruit which I had procured of the *Menſpermum*, recogniſed it immediately as being produced in vaſt abundance on that coaſt, where it is called *Garala-phala*, or the *poiſon fruit*, alſo *Cácántari*, from the circumſtance of the natives, eſpecially the Chriſtians who, he ſays, feed on crows, making uſe of it to kill them. They bruiſe the freſh or even unripe ſeeds and mix them with boiled rice into a paſte which is laid about for the crows and infallibly kills all that eats of it. He adds, that a large fruit of another kind, to which the name *Kákamári* is given, is uſed for the ſame purpoſe, but only intoxicates the crows, ſo that they may be eaſily taken. I under-

ſtand that theſe ſeeds are employed about Calcutta for catching fiſh and killing crows, but I have only been able to meet with them in a ſingle native ſhop, where they were ſold to me under the name of *Bacaen ka phal*, probably from their fancied likeneſs with the fruit of a kind of *Melia* (*Melia sempervirens*, in Sanſcrita *Mahanimba*) which goes by that name. *Cácamari* and *Garala phala* are both legitimate Sanſcrita words, though they are not to be met with in any of the dictionaries or medical writings of the Hindoos conſulted on this occaſion.

Since writing the above Mr. MURDOCH BROWN of *Anjarakandy* has favored me with the following account, in reply to ſeveral queries which I took the liberty to propoſe to him relative to this intereſting ſhrub.

"The *Cocculus Vine* is indigenous in *Malabar* and *Canara*, and "grows in the interior of moſt parts of thoſe provinces, but moſt "luxuriantly in *South Malabar* and *Travancore*. I have never "ſeen it wild within leſs than ten miles of the Sea, though I have "planted it within half a mile, where it grew vigorouſly and pro-"duced fruit. Here (at *Tellicherry*) it grows to an immenſe "ſize, overtopping the higheſt foreſt trees and by its wiry hard "tendrils catches hold of the branches of the adjacent trees and "thus creeps from one to another to an aſtoniſhing diſtance from "the parent root. When in bloſſom all theſe various branches "as well as the parent ſtem are thickly covered with large bunches "or grapes, which afterwards yield a ſurpriſing quantity of the "Berries."

"The natives make no uſe of the roots either in medicine or "for dying, ſo far as I have been able to learn."

"One of the largeſt of my planted Vines, about 15 years old "meaſures 21 inches round at about a foot and a half from the "ground." Laſt year (1817) they began to put forth their flow-

" ers on the 15th of September, and all were full of bloſſoms by " the 10th of October. The flowering branches ſhoot from the " trunk of the Vine and alſo from the wood of the large branches. " The flowers are ſucceeded by ſmall white berries, to the number " of 2 and 300 on a bunch, which continue ſlowly to increaſe in " ſize until the commencement of March, when they begin to ac- " quire a purple colour, not all together, but ſucceſſively, and fall " off, when they have become of a bright purple, one by one, as " each berry attains maturity. The birds alſo carry off great " numbers in this ſtate; a circumſtance which leads the natives " to gather them before they begin to change colour, and conſe- " quently before the kernel has acquired the oily part, which " conſtitutes its value as a poiſonous drug."

" I have never heard that the drug was put to any other uſe " but that of a vermifuge on black cattle and horſes, and for killing " or rather ſtupifying fiſh, ſo as to make them float on the ſurface " and be eaſily caught. What is carried from hence to *Arabia* " and *Perſia*, is as I have been aſſured, uſed for the ſame purpoſes. " It is probable that when freſh it would alſo kill rats and crows: " indeed it is uſed with that intention in ſome parts; but having " never ſeen this done I cannot therefore ſpeak to its effects. In " *Canara* I have met with a kind of wax made of its kernels freed " from their huſks, uſed for burning in Lamp."

" The proper name in *Malabar* is *Nanja Cooras* (Poiſon Berry), " but it is more generally known to traders and the common peo- " ple by the name of *Polla Kay* (light or imperfect fruit) from its " being gathered before maturity, the kernel not having acquired " its proper ſize to give the Berry weight. In *Canara* it is named " *Garala Phala*, but whether that be the Sanſcrit name I cannot " ſay; *Caca-mari* or *Kill-crow*, is the *Dukhani* name, and probably " derived from the uſe that is made of it."

" There is no prohibition to its exportation here ‡ and the " demand is inconſiderable. The Arabs ſtill take away a few " candies (about 670 lbs.) of it annually. The price in England " is ſo low that it will hardly pay freight, though ſome years ago " large quantities were ſold there at a high price."

Note by the Secretary.

There are ſeveral Sanſcrit terms familiarly known on this ſide of India, which might be ſuppoſed to refer to the Cocculus indicus, but which on examination prove to have nothing in conformity with it except the ſound. That amongſt theſe, the words *Cácolí* and *Caccola* are affixed to very different Subſtances, as is noticed by Dr. WALLICH, will perhaps be moſt ſatisfactorily ſhewn by the following account of them, extracted from original authorities.

Cácolí. The Hindus enumerate in their medical works a claſs of eight ſubſtances, which they denominate the *Aſhta verga* or claſs of eight: they are all *roots*, and appear to come chiefly from *Nepal* and the countries ſkirting the *Himalaya* mountains; their properties are ſuppoſed to correſpond, and they may be employed either ſeparately or collectively, as remedies in a great variety of morbid conditions: their general virtues are thus detailed: They are cool, ſweet, fattening, and aphrodiſiac, promotive of digeſtion, ſanative, lactiferous and tonic; they are corrective of the vitiated humors or wind, bile, and blood, curative of fever, and of great efficacy in urinary and phthiſical affections. They are ſeverally named *Jívaca*, *Riſhabha Méda*, *Mahaméda*, *Cácolí*, *Cſhíra Cácolí*, *Riddhi*, and *Vriddhi*: they are probably tonic medicines of ſome power and at leaſt merit further inveſtigation: the ſubſtance amongſt theſe termed *Cácolí*, is generally connected with the one ſubſequent to it in the above liſt, or *Cſhíra Cácolí*, and they are thus deſcribed

‡ Mr. W. Harrington, Collector of Cuſtoms at Madras informs me, that a very heavy duty has been laid upon the drug, amounting almoſt to a prohibition.

in the *Bhává Pracasa:* Theſe two drugs, are procured from *Morung*, and the adjacent diſtricts. *Cſhira Cácoli* reſembles the root of the *Pivari (Aſparagus racemoſus)*, and is of a white colour, a fragrant ſmell, and full of a milky ſap. The *Cácoli* is of ſimilar form and character, but of a dark hue. They are both ſweet and cooling, they remove fever, and correct a vitiated ſtate of the blood and bile: the root of the *Vidári* (Convulvulus paniculatus) and the *Aſwagandha* (Phyſalis flexuoſa), are ſeverally ſubſtitutes for the *Cácoli* and *Cſhira cácoli*.

Caccola or *Caccolaca.* This ſubſtance is always claſſed amongſt the perfumes, and forms one of the ingredients in different aromatic compoſitions, along with agallochum, frankincenſe, camphor, muſk, ſaffron, ſpices, and other ſimilar articles. It is procuerd in the bazar in different degrees of freſhneſs, and is a berry of a more or leſs irregularly oval form: when freſheſt it is inveſted with a thick green ſebaceous and fragrant coat, but in a more advanced ſtate, this ſhrinks ſo as to be ſcarcely diſcernible from the ſhell which is of a greyiſh colour; in either ſtate the centre is filled with a reſinous inflammable ſubſtance, of a ſtrong and ſpicy odour ſoluble but very ſparingly in water, and more abundantly in ſpirit. The hiſtory of this ſubſtance is not given in any of the medical works I have conſulted, nor are its character and origin known to any of the native Druggiſts, although uſed by them in many of their compounds. It appears ſometimes to be confounded with *Civet*, and it is called ſo, or *Chataſi* by the author of the *Sabda-Chandrica*, a medical vocabulary in Sanſcrit with a Bengali tranſlation: if this is not an error of the author or tranſlator, the berry ſold by the druggiſts cannot be the true *Caccol*, but I much doubt the accuracy of the interpretation: the ſynonimes will all apply to either ſubſtance, though they require to be tranſlated out of a metaphorical phraſeology: the names given in the *SabdaChan-*

drica are *Cacola, Colaca, Gandhavyácula, Tailaſadhana, Caccolaca* and *Coſhaphala* of which the two firſt and fourth, though anomalous formations, appear to relate to the *Cola* or fruit of the Jujube, to which the *Caccola* berry may be compared in appearance; *Gandhavyácula* means diſtreſſingly-oderiferous; *Tailaſadhana* either the purifier of oil, or that of which oil is the ſolvent, and it may be obſerved that civet is moſt readily ſoluble in that menſtruum; the laſt term *Coſha phalam*, may be rendered the fruit of the ſcrotum or ſheathe, referring either to the part of the animal whence it is extracted, or to the ſort of coat by which the berry is inveſted. The *Rája Nighanta* and *Bháva Pracaſa* deſcribe the medical properties of *Caccola*, and ſtate it to be pungent, bitter, warm, and carminative, ſweetening the breath, relieving heart-burn, exciting appetite and promoting digeſtion, and remedying morbid affections of wind and phlegm: neither this nor *Cácoli* therefore are conſidered as poiſonous, nor can they be confounded with the Cocculus indicus.

The only remaining word which may imply the fruit of the Cocculus vine is to be found in the vocabularies of *Amara* and *Hémachandra*, amongſt the different kinds of poiſon: no deſcription however accompanies the name, nor have the different commentators on *Amera* ſupplied this deficiency, nor illuſtrated the nature or origin of the ſubſtance, by etymological analyſis. The word is *Cácola*; it implies a poiſon, not of animal origin, and is derived according to *Raya Mucuta* from the ſame word *Cácola*, a *raven*, from its being of the like dark colour: in this it correſponds ſufficiently well with the hue that the Cocculus berry is mentioned by Mr. BROWN to acquire when ripe, and being ſimilar to it in its poiſonous property, as well in its appellation, it is poſſible that in this word we have the *Sanſcrit* origin of the name given by European writers to the fruit of the Meniſpermum Cocculus.

REFERENCE TO THE PLATES.

Primula prolifera

a. peduncle and bracte with the calyx opened;

b. corolla;

c. fruit bearing verticil.

Convallaria oppositifolia.

a. flower,

b. ditto opened;

c. pistillum;

d. e, sections of ovarium;

f. berry;

g. h, sections of the same;

i. seed;

f. g, sections of the same shewing the embryo.

C. cirrhifolia.

a. b, leaves viewed from both surfaces;

c. flower,

d. ditto opened.

Daphne involucrata.

(The letters in this plate have by mistake been engraved as capitals),

a. flower;

b. ditto opened;

c. pistillum;

d. the same with the ovarium opened.

D. cannabina, Lour?

(Two plates; the last struck off on the common sort of paper manufactured from the bark of that shrub in Napal.)

a. peduncle with the common receptacle and two detached bractes;

b. flower;

c. the same opened;

d. pistillum, with its hypogynous annular membrane opened;

e. drupe with part of the withered perianthium attached to its base;

f. g. sections of the fruit;

i. embryo;

k. cotyledons.

D. Gardneri.

a. flower;

b. ditto opened;

c. pedunele and receptacle, with a detached bracte;

d. pistillum;

e. the same, shewing the pendulous ovalum.

Andromeda lanceolata.

a. flower;

b. calyx opened;

c. corolla, opened;

D. ovarium divided horizontally.

A. ovalifolia.

a. flower;

d. ditto, the corolla removed;

b. corolla opened;

c. stamina (augmented).

Gaultheria fragrantissima.

a. flower;

b. peduncle and bractes;

c. calyx and pistillum;

d. corolla, opened;

e. stamen (augmented)

Saxifraga ligulata.

a. flower;
b. ditto opened;
c. pirtilla;
d. one of them fomewhat enlarged;
e. ovarium divided horizontally.

Blackwellia fpiralis.

a. b, flower viewed from two fides, with a detached bracte;
c. piftillum, fhewing the infertion of the ovula; all flightly augmented.

Miniſpermum Cocculus. (Two plates.)

a. partial raceme, natural fize;
b. flower,
c. ditto with its detached leaflets;
d. peduncle, all the parts of the flower removed except the nectarial fcales;
e. piftilla;
f. ovaria cut horizontally;
g. ditto divided longitudinally.

XI.

Account of a new ſpecies of TAPIR *found in the Peninſula of Malacca, by Major* FARQUHAR.—*Communicated by the Honorable* A. SETON.

Letter from Major FARQUHAR to the Honorable A. SETON.

My Dear Sir,

Conceiving that the accompanying account of an animal of the TAPIR kind, found in the foreſts in the vicinity of *Malacca*; but which I believe is not generally known to exiſt in any part of the old world, may prove intereſting, I have taken the liberty to tranſmit it to you, for the purpoſe, (ſhould you conſider it as meriting public attention), of being preſented to the Aſiatic Society: I have likewiſe the pleaſure to ſend a full length drawing of the animal, and a drawing and ſkeleton of its head, which is of very ſingular ſhape.

I remain,

My Dear Sir,

Your much obliged

and very faithful Servant

W. FARQUHAR.

MALACCA,

29th January 1816.

Claſs Mammalia, order Belluæ.

Generic character.

Seven grinders on each ſide in the upper jaw.

Six ditto ditto in the under jaw.

Four Cutting-teeth excluſive of tuſks in the upper jaw.

Six ditto ditto (four large and two ſmall) teeth in the under jaw.

Two Tuſks (or Canine-teeth) on each ſide in the upper jaw, ſhort, diſtant, obliquely truncate, ſlightly recurvated, back ones much ſmaller than thoſe contiguous to the front teeth.

One tuſk on each ſide in the under jaw more pointed and prominent than thoſe in the upper jaw.

In all twenty-two teeth in the upper, and twenty in the under jaw.

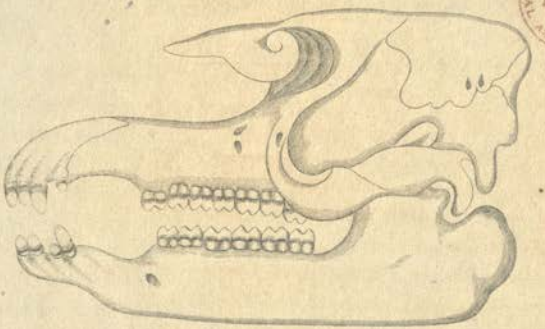
A vacant ſpace of two inches between the grinders and tuſks in each jaw, *upper* jaw projecting about half an inch over the under, and having a thin heart-ſhaped bone, four inches long, jutting out from the lower part of the forehead directly over the cavity of the noſe.

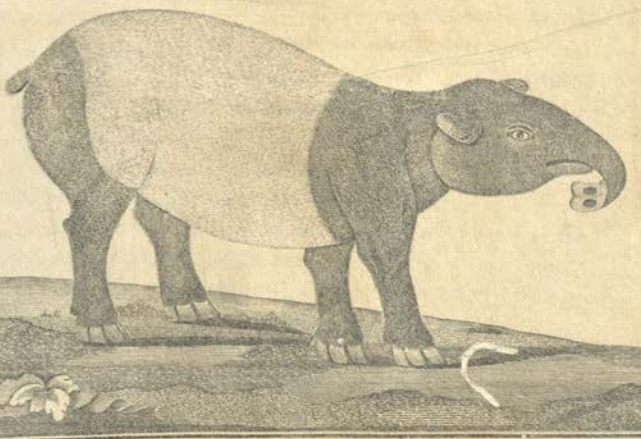
The ſkull forming a ſort of ridge at top.

The back arched.

The fore feet divided into four hoofs the hind feet into three.

The noſe of the male extending beyond the lower jaw, between ſeven and eight inches, forming a ſnout or proboſcis, extenſible and flexible.





Dimenſions of a male TAPIR, *as taken at Malacca on the 30th of November, 1815.*

Extreme length from the point of the proboſcis to the tip of the tail 7 feet.

	f.	in.
Length of the proboſcis,		7½
Ditto of the head,	1	3
Ditto of the neck,		8
Ditto of the body,	4	4
Ditto of the tail,		1½
Ditto ear,		6
Diſtance between the ears,		8
Heighth of the ſhoulder,	3	2
Ditto middle of the body,	3	4
Ditto at the rump,	3	
Ditto of the hind legs,	2	3
Ditto of the fore legs,	1	10
Circumference of the body,	6	
Ditto of the neck,	3	
Ditto of the head,	2	9½
Ditto of the proboſcis,		10½

The TAPIR (called *Tinnoo* by the Malays), is an animal, which I believe has hitherto been conſidered, by the naturaliſts as being peculiar, to the new world: it will however appear abundantly evident from the preſent account, that this is a miſtake; and that a ſpecies at leaſt of this quadruped, is common to many of the foreſts on the *Malay peninſula*, and particularly ſo in the vicinity of *Malacca*, being as well known to the natives there as the elephant or rhinoceros.

The TAPIR of *Malacca*, although differing in ſome eſſential points from that of *America*, cannot, I conceive, be conſidered

but as a variety of the ſame genus of quadrupeds. The principal difference will be found to conſiſt in the number of teeth and tuſks; the TAPIR in *America*, according to LINNÆUS has only ten grinders in each jaw, and is without tuſks; whilſt that of *Malacca* has fourteen grinding teeth and four tuſks in the lower jaw. LINNÆUS gives likewiſe to the *American* TAPIR, ten fore-teeth in each jaw, whereas the *Malacca* TAPIR has only four in the upper, and ſix in the lower jaw excluſive of the tuſks. Some other naturaliſts however allow the *American* TAPIR to have tuſks ſingle and incurvated. In every other reſpect the *Malacca* and *American* TAPIR will I fancy, be found to correſpond very nearly, and particularly in that diſtinguiſhing character of the proboſcis, or ſnout, which over-hangs the lower jaw, from ſeven to eight inches, extenſible and flexible, like that of the elephant and common only to the male.

The manner in which the feet are divided is likewiſe very peculiar; and is the ſame in both animals; having four hoofs in the fore, and only three in the hind feet. The general ſize and ſhape of the TAPIR of the old and new world will be found nearly alike, but differing in color; the head of this animal is of a ſingular ſhape, and forms a ſort of ridge at top. the eyes are ſmall, ears roundiſh and bounded with white, which can be drawn forward at pleaſure, the legs are ſhort and very ſtout, the body large, and in ſhape ſomewhat reſembling that of the hog. The neck is ſhort and thick, and the ſkin ſtrong and coarſe, like that of the buffallo. The hair is ſhort, and of a black colour, from the proboſcis to the extremity of the four quarters; The body and part of the hind quarters of a light grey, and the reſt of the hinder parts and legs are black. The tail is very ſhort, and almoſt deſtitute of hair; It has no mane on the neck, in which reſpect it ſeems likewiſe to differ from the *American* TAPIR;

when young it is beautifully ſpotted with brown and white.

The TAPIR of *Malacca* is not known to the natives as an amphibious animal; it is perfectly harmleſs, and of a timid diſpoſition. Indeed it ſeems deſtitute of any natural means of offence or defence. It feeds on vegetables, and is ſaid to be particularly fond of ſugar-cane. Its fleſh is eaten by the natives (with the exception of Mohummedans, who deem it unclean) and conſidered very good: none of theſe animals have as yet been domeſticated at *Malacca*, but I have no doubt if taken when young, they might be tamed with equal facility as thoſe of *America*.

The drawing which accompanies this will be found a faithful repreſentation of the *Malacca* TAPIR. It is taken from life, and will convey a much better idea of the animal than any deſcription I am able to give.

It is, I think, very poſſible that the *Malacca* TAPIR may be found to correſpond more cloſely with one of the two foſſile ſpecies deſcribed by CUVIER, in his geological diſcoveries, as having been met with in different parts of *France*, *Germany*, and *Italy*, the one named the ſmall, the other the gigantic TAPIR.

It may be proper to remark that the foregoing dimenſions were taken from a TAPIR, which had not attained its full ſize; I have the head of a full grown one now by me which meaſures two inches more in circumference than the above.

Additional obſervations by the SECRETARY.

THE diſcovery of the preſence of an animal in the eaſtern hemiſphere, which has been hitherto ſuppoſed peculiar to the new world, is a circumſtance that deſerves the fulleſt illuſtration which

the Society can beſtow upon it: and it has therefore been deemed adviſable, to publiſh the following additions to the valuable communication of Major Farquhar: the firſt of theſe, from the pen of a diſtinguiſhed pupil of our illuſtrious aſſociate M. Cuvier, ſhews ſatisfactorily, that the animal diſcovered by Major Farquhar is eſſentially the ſame as the Tapir of *South America*, and the ſecond from G. J. Siddons Esq. late Reſident at *Bencoolen*, preſenting to the Society a living animal of this deſcription, informs us of a fact, which is equally intereſting in a geological and zoological view, and proves that the exiſtence of the oriental Tapir is not limited to the Peninſula of *Malacca*.

Obſervations by M. Diard, *on the* Tapir *of Malacca.*

When an error has originated with a diſtinguiſhed writer it paſſes long current under his ſanction, and is ſlowly and reluctantly corrected; it is to this circumſtance we muſt attribute the repetition by Linnæus, Buffon, Shaw, and other eminent naturaliſts, of the miſtake committed by Margrave, when he firſt gave a ſcientific deſcription of the Tapir of *South America*, and who has erroneouſly aſſerted, that the animal had but twenty teeth in each jaw; or ten *molares*, ten *inciſores*, and no *dentes canini*: it is not eaſy to conceive how Margrave, in general ſo exact, and who had ſo many opportunities in the *Brazils*, of examining the living animal, ſhould have fallen into ſuch an error, for the Tapir of *America* has in the upper jaw 14 grinders, two canine, and ſix cutting teeth, and in the lower jaw, but 12 grinders, with the ſame number of canine and cutting teeth as in

the upper; making in the whole forty-two teeth; and upon the moſt careful examination of the ſkull of the TAPIR of *Malacca*, depoſited in the SOCIETY's Muſeum, I can confidently aſſert that the teeth agree in number, form, and proportion, preciſely with thoſe of the *American* TAPIR. In the upper jaw there is an imperfect evolution of the two canine teeth, and the two outer inciſors have all the appearance of tuſks, and this accounts for the error in the deſcription, which the excellent naturaliſt, who has enriched zoology with ſo important a diſcovery, has committed; the ſame miſtake has indeed been lately made, with reſpect to TAPIR of *America* by the learned FELIX D'AZZARA, and it is one of very natural occurrence, as the two outer inciſors have the character of tuſks, and the more ſo, from being much more prominent than the true canine teeth; they are eaſily however diſtinguiſhed, by the cultivator of comparative anatomy, by their inſertion in the bone peculiar to the *inciſors, (os inciſif)*; an articulation that would leave no doubt of their real character, even in the entire abſence of the *dentes canini*, and a proof of the value of a ſcience, which determines the nature of parts, by the immutable laws of anatomical poſition, and not by the uncertain, and varying teſt of external appearance.

The identity of the TAPIR of *Malacca*, with that of *South America* makes it of courſe a different animal, from the ſmall foſſile ſpecies, deſcribed by M. CUVIER, as that has been ſhewn to differ widely from the *American* animal, both in the dentition, and in the conformation of many parts of the maxillary bone.

For the correct number and accurate nature of the teeth of the *American Tapir*, natural ſcience is indebted to MESSRS. GEOFFROY ST. HILLAIRE and CUVIER. To Major FARQUHAR alone belongs the honor of having firſt given, with the trifling exception I have noticed, a correct deſcription of the intereſting animal which

forms the ſubject of theſe obſervations.

I have only to add, that the young male TAPIR which is in the menagerie at *Barackpore*, is in all reſpects the ſame, with that deſcribed by Major FARQUHAR.

Letter from G. J. SIDDONS *Eſq. to the* SECRETARY *to the* ASIATIC SOCIETY.

Sir,

I have ſent on board the Ship Claudine, commanded by Captain WELSH, a very rare animal called on this Coaſt the *Tannoh* which I beg you to preſent to the Aſiatic Society in my name.

It reſembles, with extreme cloſeneſs the TAPIR of BUFFON. It was preſented to me by the *Pangeran* of *Soongye Lamowe*, who informed me that it was caught in a paddy plantation upon his lands in the interior. Search was made for its parents, but no traces of them were diſcovered: the people were attracted by the ſhrill cry of the animal, which they found at the edge of the paddy ground, cloſe to a thicket, amidſt very long graſs, the *Pangeran* himſelf is, perhaps, the oldeſt man living in theſe diſtricts: He ſays that he never ſaw but one other animal of this deſcription, which was when he was about ten years old, and that he has never heard of one having been ſeen ſince, that which he then ſaw was of the ſize of a ſmall cow.

The *Tannoh* eats boiled rice, after it has got cool, graſs, leaves &c. It is of a very lazy habit, but perfectly gentle, and loves to bathe, (remaining a very conſiderable time under water) and to be rubbed or ſcratched, which he ſolicits by throwing

himself down on his side. He has been in my possession almost three months, during which period he has grown considerably, and his skin has changed from a dusky brown, streaked and spotted with white, to its present appearance.

I trust the animal will reach *Calcutta* alive, when no doubt it will gratify the curious in natural history.

I remain

Sir,

Your very obedient servant

SUMATRA,
Fort Marlborough
6th Dec. 1816.

G. J. SIDDONS.

The animal described in the letter from Mr. SIDDONS, is the one alluded to by M. DIARD, and is still living in the menagerie at *Barackpore*: It's habits continue of the gentle and indolent character mentioned in the preceding communication, and it agrees with Major FARQUHAR's description in every respect, except in its evincing a great fondness for water: it constantly seeks a pool in which it remains immersed the greater part of the day; and not unfrequently dives for a very considerable period, presenting in this respect another analogy to the TAPIR of *South America*.

The following measurements have been recently made of its dimensions.

	f.	*in.*
Extreme length from the point of the proboscis to the tip of the tail,	7	6
Length of the proboscis,		5
Ditto, head,	1	6
Ditto, neck,		

Ditto, . body,	4	6
Ditto, . tail,		2
Height at the ſhoulder,	2	9
Ditto, middle of the body,	3	1
Ditto, . rump,	2	
Ditto, . fore legs,	1	8
Ditto, . hind legs,	1	5
Circumference of the body,	5	4
Ditto, . neck,	2	8
Ditto, . head,	2	10
Ditto, . proboſcis, about		7

The following deſcription of a young animal, received ſubſequently from Major FARQUHAR, with ſome other intereſting communications on ſubjects of natural hiſtory, will complete the information we at preſent poſſeſs regarding the *oriental* TAPIR.

The drawing which accompanies the following account of a young TAPIR, and which I have the pleaſure of offering to the acceptance of the ASIATIC SOCIETY, was taken from an animal about four months old, and repreſents it as of a reddiſh brown colour, ſtudded with white ſpots. It was taken from one I had alive in the houſe. After it has paſſed the above period, it begins gradually to change colour until the age of ſix months, by which time it has loſt all its beautiful ſpots, and attained the general color of the full grown TAPIR as repreſented in a drawing I tranſmitted from hence to the ASIATIC SOCIETY in the beginning of laſt year. The TAPIR from which the preſent drawing was made, I preſerved alive in the houſe for upwards of ſix months, when it died ſuddenly. I found it an animal poſſeſſed of a moſt mild and gentle diſpoſition It became as tame and familiar as any of the dogs about the houſe, fed indiſcriminately on all kinds of vegetables; and was very fond of attending at table to receive

bread, cakes, or the like. It ſeemed very ſuſceptible of cold, notwithſtanding the great thickneſs of its ſkin, and I think I may venture with great ſafety to affirm that the TAPIR of *Malacca* has nothing amphibious in its nature, a character which appears to attach to thoſe of America: indeed the one I reared ſhewed rather an averſion to water, and in the wild ſtate they are found to frequent high grounds.

XII.

An Account of a new ſpecies of a CAMELLIA *growing wild at Napal. By* N. WALLICH *Eſq. Superintendent of the Botanic Garden, Calcutta.*

Read December 12, 1818.

AMONG the numerous valuable additions which the Botanic Garden at Calcutta owes to the indefatigable and ſucceſsful reſearches of the Honorable Mr. GARDNER, are ſpecimens in full bloſſoms, plants and ripe fruits of the genuine Tea ſhrub and its nearly allied neighbour, the *Camellia*. Of the former of theſe, he informs me, there is only one ſhrub at *Katmandu*, growing in the garden of a Caſhmeeree, where it was originally introduced from *China* while a young plant. It has attained a height of 9 or 10 feet, is rather tall than buſhy, being of no great circumference in its branches or ſtem, but thriving exceedingly well, producing abundance of bloſſoms and ripe capſules annually, from September to November. Moſt of the offsets which Mr. GARDNER has cauſed to be taken from it have unfortunately failed after continuing very vigorous for ſome time after they had been put in the ground, but as the attempt will be repeated I doubt not, that both the Tea-ſhrub, and the equally intereſting *Napal Camellia* will before long be introduced into ſuch parts

of the Northern Hindooſtan, as may appear beſt calculated to their ſucceſsful cultivation. The tree which is the ſubject of the preſent enquiry was diſcovered by Mr. GARDNER on the mountains of *Sheopore* and *Chandra Ghiri*, which form the boundaries of the Valley of *Katmandu* to the North and South, and have been noticed in KIRKPATRICK's account of *Napal*. It grows to a conſiderable ſize throwing out numerous leafy branches, and producing bloſſoms during the rainy ſeaſon, that is from July to October, ſucceeded by abundance of fruit which ripen in the courſe of three months. Notwithſtanding the conſpicuous oilineſs of its ſeeds, the tree does not ſeem to be uſed by the natives for any purpoſe but that of fuel. Mr. GARDNER remarks with great juſtice, that it is ſo like the genuine Tea both in its leaves and bloſſoms, as to be eaſily miſtaken for it; the very ſame obſervation has been made by Chevalier THUNBERG in his *flora japonica*, in ſpeaking of his *Camellia Saſanqua*, a circumſtance which corroborates the affinity which exiſts between theſe two ſpecies. I conſider them however as ſufficiently diſtinct from each other, and ſhall conclude my deſcription of the *Napal* tree, which I propoſe calling *Camellia Kiſſi*, the *Newar* name being *Kiſſi* or *Kiſſi-Soals* by enumerating the points on which their ſpecific difference appears to me to reſt. Mr. GARDNER informs me that, like thoſe of the *Saſanqua*, its leaves acquire on being dried the peculiar fragrance of Tea; and that he intends trying them as an improver of and ſubſtitute for the latter, in the manner in which Profeſſor THUNBERG informs us that his tree is uſed in *Japan*.

Camellia Kiſſi, *Wall.*

Foliis ovato-oblongis attenuato-acuminatis, acuté ferrulatis baſi integerrimis, petiolis ramulique novellis villoſulis; floribus axillaribus terminalibuſque ſubternis, ſtylo breviſſimo ſtigmatibus elongatis,

capſulis trivalvibus triſpermis glabris.

Arbor ramoſiſſima, umbroſa, cortice ramulorum cinerafcente, novellorum petioliſque villoſis.—*Folia* alterna, patentia, approximata, coriacea, ovata, v. ovato-oblonga, tripollicaria, ſeſquipollicem lata, interdum majora, acumine ſemipollicari margine convexiuſculo, exceptâ baſi acutâ, ſerrulato, laevia, ſuprâ atroviridia lucida, ſubtus pallida, coſtâ elevatâ, nerviſque obſoletis obliquis ad peripheriam anaſtamoſantibus.—*Petioli* planiuſculi, ſulco lato exarati, vix ultra lineas duas longi.—*Flores* albi terni, nunc in axillis ſolita rii v. terminales geminati, ſeſſiles.—*Calyx* octophyllus, caducus, aeſtivatione gemmaceus conicus ſemipollicaris, foliolis ovatis imbricatis concavis coriaceis fuſceſcentibus obtuſis cumcuſpidulâ minuta, ad apicem leviter fericeis, exterioribus minoribus.—*Petala* obovata, retuſa, patentiſſima, baſi anguſtata, ſemipollicaria, dorſo parum fericea.—*Stamina* octoginta v. plura, petalis parum breviora, cumque illis patentia, filamentis craſſis duplici vel triplici ſerie ad baſin con nata in annulum anguſtum pallidé aurantiacum ovario breviorem.—*Antheræ* complanato-ovatæ, diſco carnoſæ, utrinque dehiſcentes, biloculares.—*Ovarium* ſubrotundum obſoleté triangulare, villis denſis fericeis veſtitum, triloculare; ovulis in ſingulo loculo ſex v. pluribus axi inſertis.—*Stylus* craſſus, brevis, villoſus.—*Stigmata* tria filamenta ſubæquantia, patentia, clavata, intus ſulcata, apice papilloſa.—*Capſula* rotundato-triangularis, pollicaris, lignoſo-coriacea, trilocularis, nunc bilocularis, trivalvis, valvis lato-ovatis, apice incraſſatis marginibus truncatis latis; extus fuſca ſubnigricans, glabra; immatura pubeſcens.—*Diſſepimenta* membranacea, contraria, nunc incompleta v. ſubobliterata.—*Semina* ſolitaria grandia, nucamentacea, fuſca, gibboſo-convexa, intus planiuſcula vertice umbilico parvo notata; unicum reliquis ſæpius majus; uno, duobuſve nunc abortientibus.—*Integumentum* duplex; exte-rius

cruſtaceum, fragile; interius tenue, fuſcum, lamelloſo-membranaceum, venuloſum. — *Receptaculum* centrale, triquetrum, apice ſemina affigiens, demum liberum. — *Albumen* nullum. — *Embryo* ſemini conformis, hinc gibboſus. — *Cotyledones* amygdalino-carnoſæ, valde inæquales, una ſupra alteram, oleinæ. — *Radicula* parva conica intra cotyledonum baſes excavatas latens, centripeta.

Obſervation. I have already hinted above at the great affinity which exiſts between this ſpecies and Thunburg's *Safanqua, Flora Japon.* 272. t. 30; the latter differs ſpecifically in having blunt and ſmaller leaves, ſolitary terminal flowers, a long ſtyle and villous capſules; its ſize is alſo much larger than that of our plant, which never grows beyond the height of a ſmall tree. The figure of that ſpecies in Lord MACARTNEY's Embaſſy to China, vol. II. p. 467 agrees better with our plant, but its leaves ſtill want the decided acumen, beſides being more deeply ſerrated. The common *Japan* roſe has more firm and ſhining leaves with ſtronger ſerratures, its flowers are much larger and the petals of a leathery thick texture.

On referring to the drawings of the Botanic Garden which were executed in the latter part of 1814, during the Superintendence of my eſteemed friend and predeceſſor Dr. FRANCIS HAMILTON (late BUCHANAN) I find, he has figured a ſpecies of Camellia under the name of *Chamegota*, ſo called by the natives inhabiting the mountainous countries bordering on *Sylhet*, from whence it was ſent by my indefatigable aſſiſtant, Mr. M. R. SMITH, who obſerves in his letter accompanying the ſpecimen, that it grows to the height of about 7 feet, and is covered in December with white fragrant bloſſoms. I am unable to diſcover the leaſt difference between that and the *Napal* plant, and heſitate not conſidering them as one and the ſame ſpecies.

Since the preceding account was written I have had an opportunity of comparing my plant with the deſcription and figure of *Camellia oleifera* publiſhed by Mr. CLARK ABEL in his intereſting journey to the interior of *China* (p. 174 c. icone, et p. 363). Theſe two ſpecies are unqueſtionable very like each other; that from *Napal* may however, be diſtinguiſhed by having larger acuminate leaves, not altogether deſtitute of nerves and but ſlightly marked, on their under ſurface, with elevated dots, which are only obſervable by means of a powerful lens; its flowers being ſmaller and its ſtyle much ſhorter than that figured in the plate attached to Mr. ABEL's deſcription. The variety mentioned p. 199, has ſtill greater affinity to my tree.

The leaves of the *Napal* tree have a very ſtrong but tranſient ſmell of Tea; but their infuſion, poſſeſſes only to a very ſlight degree its flavour, owing perhaps as Mr. GARDNER juſtly obſerves, to the defective manner of gathering and drying them for the trials which he inſtituted. It has been aſcertained by my eſteemed friend that the Napaleſe extract an oil from the ſeed of the *Kiſſi* by preſſure, which is much valued by them as a medicine. The ſeedlings reared in the botanic garden at *Calcutta* are thriving very well.

The ſtem and branches of this tree are ſubject to the growth of large ſeſſile excreſcences, perhaps a ſpecies of paraſitical fungus, of an oval form and ſpongy texture which are ſaid to be very poiſonous. They have been repeatedly ſent to me in a dried ſtate attached to ſpecimens of the *Camellia*, but I have as yet not been able to aſcertain their ſpecific nature.

XIII.

An Account of BIJAPUR *in* 1811, *by Capt.* G. SYDENHAM, *of the Madras Eſtabliſhment. Communicated by Col.* C. MACKENZIE.

THERE is perhaps no place in *India* leſs known, and more worthy of being known, to Europeans, than *Bijapúr*. Few have ſeen this City, and ſtill fewer have deſcribed it. The account of TAVERNIER, the firſt European traveller of note who viſited it, and who was there, it appears, in 1648 A. D. is ſtrangely inaccurate. This authority is followed by THEVENOT, who had not the means of aſcertaining its truth by perſonal obſervation. Both deſcribe *Bijapúr*, as a City exhibiting nothing remarkable but crocodiles in the ditch which ſurrounds it. Had BERNIER, the moſt intelligent and correct of all the writers of that period upon *India*, ſeen *Bijapúr*, he would have vindicated it from the miſrepreſentations of his predeceſſors: and moſt probably have aſſociated with the Cities of *Delhi* and *Agra*, of which he has given ſo faithful and intereſting a delineation, the capital of the ÂDIL SHÂHÎ dynaſty (a). ORME, in his fragments, laments the want of information reſpecting *Bijapúr*; and we are indebted to Major MOOR (b), for having detected and expoſed the inaccuracies

(a) See Scott's History of the Dekkan, vol. I. p. 107.

(b) Narrative of the Operations of Captain Little's Detachment, p. 310.

which had for more than a century involved in obſcurity one of the moſt ſplendid Cities in *India*; and for having brought to light its hidden beauties, in a faithful deſcription of them written in 1794. Sir JAMES MACKINTOSH viſited *Bijapúr* in 1808, and emphatically termed it the *Palmyra* of the *Dekkan*. The following account is drawn from an attentive ſurvey of this City, in 1811.

THE objects which attract particular notice at *Bijapúr*, are claſſed in this imperfect ſketch, in the following order:

1ſt The Fort and inner Citadel,
2d The remains of the City,
3d The principal edifices and public works within the Fort,
4th Thoſe outſide of it,
5th and laſtly, a few curſory remarks will be offered on the hiſtory of the place, and on its preſent ſtate.

1ſt. THE wall of the Fort was completed by ALÍ ÁÁDIL SHÁH in the year 1566 A. D. (c). Its defences conſiſt in a rampart flanked by 109 towers of different dimenſions, a ditch and covert-way ſurrounding it, and a Citadel in the interior.

THESE works are very ſtrongly built, and ſtill in tolerable repair; their exterior and interior revetments are of hewn ſtone, laid in *chunam*. The parapets are compoſed entirely of the ſame materials, and are 9 feet in height, and 3 feet in thickneſs. The towers are in general ſemi-circular, with a radius of about 36 feet. The curtains appear to riſe from the bottom of the ditch, and vary from 30 to 40 feet in height, being about 24 feet in thickneſs. The ditch is in many parts filled up, and ſo covered with vegetation, that not a veſtige

(c) Scott's History of *Dekkan* vol. 1. p. 299.

it appears. In other parts it seems to have been formed through rock, in breadth from 40 to 50 feet, and about 18 in depth, a reveted counterscarp is discernible in many places, and the remains of a line of masonry running in a parallel direction at the distance of about 70 yards in front of this, point out the boundary of the covert-way. The circumference of the counterscarp is $6\frac{1}{2}$ miles and the form of the Fort an irregular circle.

The works of the Citadel (d) are composed of the same materials; it is regular and the defences consist of a rampart and fausse-braye flanked by towers and a wet ditch about 120 feet in breadth; the space between the ramparts and the wall of the fausse-braye is very broad, the ditch entirely surrounds it; but the ramparts of the body of the place are not complete: there being about 3 furlongs in length on the north face open. The circumference of the counterscarp of the ditch is about 5 furlongs. It's water is good and contains abundance of fine fish, but no alligators, as has been stated by former writers. There is but one entrance into the place, which is through two gates; one of them called the iron gate, is of wood cased with that metal. (e)

The Citadel is said to have been built by Yusuf Ââdil Sháh the founder of the dynasty of *Bíjapúr*, and afterwards improved by his successors.

2dly. To the westward of the Fort are the remains of a most extensive City. To trace its limits would be a day's work. It is now an immense mass of ruins, but from the innumerable tombs,

(d) *Kilai* [illegible].

(e) [illegible] description of the Fort I am chiefly indebted to a Memoir of the late Lieut. Davies of the [illegible]dras Engineers, kindly communicated by Colonel Mackenzie, Surveyor General of India.

moſques, caravanſeras and edifices of every deſcription which it exhibits, it muſt have been one of the greateſt Cities in *India*. It was formerly divided into ſeveral *púras* or quarters. One of theſe *Shah-púra* is alone 6 miles in circumference, and is ſaid to have contained an hundred thouſand buildings. It lies ſouth-weſt of the Fort, and being that part of the City which was laſt built, the remains of its walls and ſtreets are ſtill perceptible, and it is diſtinguiſhed by ſeveral monuments of ancient grandeur, whoſe durability has reſiſted the havock of time. To the ſouth-weſt of this quarter is *Afzal-púra* and next to that *Ibrahím-púra*. Of the former, there are no remains but tombs, moſques &c. which is the caſe with the other, excepting that part moſt contiguous to the Fort, which has been repaired and forms the preſent *Pettah*. On the ruins of the ſouth-weſtern extremity of the old City, now ſtands a walled town called *Túrwái*, about two miles from the Fort, in which there are many buildings worth ſeeing.

3dly. The moſt conſpicuous object within the Fort is the *Makbara* (f) of Sultán Muhammed the laſt independent ſovereign of the Ádil-Sháhí dynaſty. This ſtately building is 150 feet ſquare in the inſide, and including the dome upwards of 130 feet high. The diameter of this dome, I take to be not leſs than 130 (g) feet; its thickneſs I aſcertained by meaſurement to be 9 feet, and as its ſhape is ſemicircular, its perpendicular height is of courſe 65 feet. The diameter in its concavity has been eſtimated at 117 feet, but as I aſcended to the top of the building, I found that the diameter of the outer circle was equal to the inner width of the building, from which by ſubtracting double the thickneſs of the dome, its inner diameter was at once aſcertained. There is a circular ledge 12 feet

(f) Literally "Places of burial," and applied to the Tombs of Kings and Nobles.
(g) Only 10 feet leſs than the diameter of the Cupola of St. Peter's.

broad projecting into the area of the building from the bottom of the inner circumference of the dome, which is so ingeniously laid upon supports inclining inwards to the side walls in graceful curves, that it does not apparently diminish the width of the room, but is rather an ornament to it. It cannot be called a cornice, but affords the same relief and effect. I found my way to it through a niche in the cupola, and on raising my voice, the echo from the top was so perfect, that I could fancy it the voice of another person mimicking me. The tomb of the SULTÁN lies under a wooden canopy in the centre of the room on a platform of granite 80 feet square and raised 4 feet above the floor. On the right of the SULTÁN's tomb, as you enter, are the tombs of his son and daughter-in-law; on the left, the tombs of a favorite dancing-girl, his daughter, and his wife. Over a lofty door-way through which you enter on the southern side, are some Arabic inscriptions in *Togra* letters which are sculptured, in alto-relievo. The characters are gilded, and the ground is painted with a liquid preparation of *lájaward* or lapis lazuli which gives the whole an appearance of a beautiful distribution of gold and enamel. All the inscriptions which I shall have occasion to mention are sculptured and ornamented after this fashion, and being disposed in all varieties of shape and figure have a very elegant effect. They are said to be all extracts from the *Korán*, but the characters are so entwined and interwoven with each other, that the quickest reader of this hand would find some difficulty in decyphering them. I was, however, successful in discovering a Persian inscription here, which is a chronogram on the death of Sultán MUHAMMED. The line is عاقبت محمود گشت, "the end of MUHAMMED was happy," and the date answering to it = 1067 Hijrí. (h) On the outside of this face is suspended from the top of the building,

(h) A. D. 1656.

in a triangular chain a large ſtone, which my philoſophic conductor inſiſted upon calling "thunder-bolt," declaring that it poſſeſſed the virtue of protecting the fabric from injury. The height of the building including the baluſtrades, which are 6 feet high, and excluſive of the dome is 110 feet. Theſe baluſtrades are relieved on each face by two cupolas near the corners, under them is a gallery about 10 feet high and 5 broad, preſenting to the front of each face a neat arcade of 19 arches. At the four corners of the tomb are minarets, well adapted in their conſtruction to the reſt of the work. Their height, including that of the domes by which they are ſurmounted, is about 140 feet. Their ſhape is octagonal, one ſide of the octagon reſting againſt a projection from the corner of the building, which contains a narrow circular ſtair-caſe, by which you aſcend to the top. Each minaret has eight ſtories: ſeven of theſe are octagonal rooms of 12 feet diameter, with an arched roof: each ſide of the octagon has an open arch 6 feet in depth, and over them are rings for fixing *perdas*. You enter theſe ſmall rooms from the ſtair-caſe through one of the arches; and through the other ſeven you look out into the court. The whiteneſs of the minaret is relieved by a cornice of dark granite between the arches, and alſo by its dome, the ſtone of which is of a reddiſh tinge. Again, theſe arches, with the intervening cornice, and the baluſtrades ſurrounding the baſement of the dome, give a lightneſs to the minarets which their bulk would have prevented, had not its effect been counterbalanced by the ſkill and taſte of the architect. The minarets have alſo a fine relief from the body of the work, the ſtone of which is well poliſhed and of a dark colour. The outſide of the large dome is white and the domes of the minarets, the ſmall cupolas, and baluſtrades, of a reddiſh coloured ſtone.

The general ſtyle of this tomb is grandeur and ſimplicity, and

its construction does credit to the taste of the architect and to the munificence of its projector.

The tomb is raised on a terrace of granite 200 yards square, and 2 high, with a plain cornice on the edge. Opposite the eastern and western faces of the building in the centre of this platform are large fountains; and from the western side of it projects another terrace to the distance of 30 yards, at the end of which is situated the mosque, which is 20 yards long, and has a handsome dome over its centre. The style of the mosque corresponds with that of the principal building, and its minarets are extremely neat. The whole is situated in a capacious enclosure upwards of 300 yards square, containing ranges of buildings with an arcade in front. The northern face is close to the rampart of the Fort, and in the centre of the southern face is the *Nakkár-Khánah* (1) through which you enter this court, after having passed an outer enclosure of between two and three hundred yards square, with an arcade on each face, containing ranges of rooms for public accommodation. From the top of the minarets of the tomb you have a perfect view of the Fort and all the fine edifices that it contains, and of the country several miles beyond it in every direction. The tomb and all its contiguous structures were built by Sultán Muhammad himself.

The object which next presents itself for notice is the *Jám Masjíd* or public mosque, a very elegant structure. In the centre of the building is an open space 75 feet square, over which the dome is raised: the walls on the four sides of this square have each three open arches. The centre arch is the largest of the three, and on each side of it, is a narrow ornamental band running perpendicularly up the wall, and joining another band laid diagonally above the arch.

(1) Pg. where a large Drum, called the *Nakkarah*, is beaten.

This ornament is composed of a chequered work of very small tiles, painted alternately with blue and yellow colours of a most brilliant hue, the continuity of which is relieved in the centre of each band, by ornaments, in which there is a more graceful and variegated disposition of the tiles. Over the arches which face the *cuba* or recess, and above the band, are three illuminated inscription in *Togra*. (j) The side inscriptions are immediately above the side arches, and in Arabic characters disposed in a circular form. The central ornament, which is above the centre arch, partakes more of the form of a narrow ovel, and contains the following inscription, in large letters الله محمد ابو بكر عمر عثمان حيدر ALLAH, MUHAMMED, ABUBACR, ÔMAR, ÔSMÁN, HYDER, (i. e. Ali) (k) by which we find that Sultán MUHAMMED, by whose order all the ornaments in the mosque were executed, was a *Sunni* (l) though all his predecessors except the last, were of the *Shiah* (m) sect. The recess itself is most richly decorated with a profusion of gilt and enamel, and covered with beautiful inscriptions, all in Arabic, with the exception of a stanza in Persian, on the instability of this life, and this chronogram, بناى مسجد سلطان عاقبت محمود "the building of the mosque of the Sultán whose end was happy" which makes the date of the completion of the mosque to be 991 Hijrí. (n) The whole of the building is raised upon a terrace about 15 feet from the ground, which has vaults underneath it. The height of the top of the dome from the surface of the ground is 140 feet. The outside of the building presents a double arcade in each face: the lower one is closed, but the upper row is open, and constitutes the front of a spacious gal-

(j) A large ornamental character in arabic writing.

(k) The names of the prophet and his four immediate successors, in the order in which they succeeded to the Khalipha.

(l) Orthodox.

(m) The principal sect of Dissenters. A full account of both sects is contained in D'Ohsson's Tableau de l'Empire Ottoman.

(n) A. D. 1583.

lery, which is ſaid to be conſtructed on a ſimilar plan to that at *Mecca*. The edifice was founded and nearly finiſhed by ÂLÍ ÂÀDIL SHÀH. It was completed by his ſucceſſor IBRÂHÍM 2d. and the ornamental parts of it were executed in the reign of his ſon MUH'AMMED. The *mímbar* or pulpit, conſiſting of three ſteps of white marble was furniſhed by AURENGZÉB, who alſo built the outer half of the wings and the gate-way fronting the moſque. He likewiſe *chunamed* the floor, and divided it into more than two thouſand *muſallas* or partitions marked by black lines upon which Muſſamedans pray. But he carried off a maſſy ſilver chain ſuſpended from the top, to the end of which was faſtened a large ruby, which, the principal attendant gravely aſſured me, had a luſtre ſo brilliant as to give light to the moſque at night. He alſo took away all the *muſallas* of velvet ſatin and broad-cloth, which formerly covered the floor: every thing that he pilfered was converted into money and diſtributed to his troops. This account may perhaps be exaggerated; but as this conqueror was not very ſcrupulous in matters of religion, except in the obſervance of it's outward forms, tho' he once aſſumed the garb of a *fakír* to cloak his ambitious deſign; and as he had a numerous army to maintain who were ſometimes clamorous for pay, he thought probably as little of robbing a moſque, as ſome conquerors of the Weſt have done, of plundering churches.

THE next in order to the above buildings is the unfiniſhed *Maſbara* of ÂLÍ-ÂÀDIL SHÀH. It was conſtructed by the SULTÁN himſelf upon a terrace 15 feet high, and upwards of 200 feet ſquare. In each face are ſeven lofty arches, thirty feet high and 20 broad; and between the oppoſite ſides are ſeven rows of theſe arches. They were all completed when the SULTÁN died, and the work remained unfiniſhed without being roofed. It is ſaid that ÂLÍ-ÂÀDIL SHÀH intended to have built an upper ſtory of the ſame dimenſions, over

the centre of which was to have been reared a dome, ſuitable to the magnitude of the building, which had it been finiſhed would have been a more ſtupendous work than the Mauſoleum of MUH'AMMED. But even in its preſent ſtate, it is a grand object, and from the ſtyle of the arches has ſome reſemblance at a diſtance to a ſplendid Gothic ſtructure in ruins.

SECANDER the laſt ſovereign of this dynaſty, who yielded the Fort and his perſon to AURENGZÉB, lies under, a mean tomb-ſtone, like that of TÁNAH-SHAH (o) at *Rauza;* and the ſepulchres of both theſe royal captives afford a melancholy exhibition of the inſtability of human greatneſs. Near this building are the *Táj Bauri*, a moſt capacious Well conſtructed by SENED-UL MULC, an eunuch of IBRÁHÍM's court, the tombs of ÂBDUL REZA, and his ſon, celebrated *fakírs* in his reign, the ſepulchre of AURENGZÉB's daughter (queen, he ſays) &c. The agates and pavement of the latter, with the greateſt part of the marble railing round the tomb have been removed by ſacrilegious hands ſince Moor viſited it. There is another Well near the north-weſtern angle of the Fort very little inferior to the *Táj-Bauri*. It is the work of CHÁND BÍBÍ, the wife of ÂLÍ-ÂÀDIL-SHÁH, and daughter of one of the NIZÁM SHAHÍ ſovereigns, who in the reign of IBRAHÍM 2d. repaired to her brother's court, and defended *Ahmad-nagar* ſo gallantly againſt SULTÁN-MURÁD; and whoſe heroiſm received ſo juſt a tribute from the pen of FERISHTA. On one ſide of this fine Well is a neat little moſque. The *Uperi Burj* or lofty cavalier inſide of the Fort was built by H'YDER KHÁN, a noble in the court of IBRÁHÍM ÂÀDIL-SHÁH 1ſt. There is a ſmall but neat building called the *Kadam i-Raſúl*, but vulgarly and improperly ſo, as it is ſuppoſed to have contained a few precious hairs of the prophet's beard, not an impreſſion of his foot; MUH'AMMED SHÁH removed

(o) The laſt King of the KUTB SHAHÍ dynaſty of *Golconda*, taken priſoner by AURENGZÉB.

them from this palace to a grand edifice which he erected close to the eastern wall of the Citadel, and communicating with it, and which he at first intended for his own Palace. By another account it appears that they were deposited by AURENGZEB in the palace of MUH'AMMED, which is now called *Áfár-i-Sharíf*, from the holy relics, it is still believed to contain. This absurd story of the *Áfár-i-Sharíf* is alluded to by FERISHTA, who relates that, MÍR MUH'AMMED SÁLIC HAMADÁNÍ, a venerable *Saiyid*, arriving near *Bijapúr*, (p) and bringing with him some hairs of the prophet, the SULTÁN, (q) eager to pay his respects to such valuable relics, went out to meet him; and having conducted him into the City entertained him with royal magnificence for many days. He endeavoured to prevail upon him to fix his residence at his court, but the holy-man was earnest to perform the pilgrimage to *Mecca*; and at his departure the SULTÁN conferred upon him many rich presents, and received from him two of the sacred hairs, which he placed with care in a golden shrine set with jewels, and constantly visited it every Friday night and upon all holy-days. None have now access to them, but those who are interested in the imposture, or who are superstitious enough to believe it a reality. The dimensions of the hall of this palace, will give some idea of the whole building. It it about 50 paces long, and 15 broad, and it's height may be 75 feet. It's front has one large arch in the centre, and a smaller one on each side. Immediately before the hall is a grand reservoir 75 yards long, 60 broad, and 6 deep, into which projects a small terrace, from the central arch, with a wooden railing round it. The greatest part of the palace is in ruins. At one end of the hall lies a large slab of yellow stone richly veined, nearly 6 feet long, 2 feet broad, and one span thick. It is of the same kind as the

(p.) 1595. A. D.
(q.) Ibrahim 2d.

ſmall variegated ſtones which you ſometimes ſee inlaid in the pavement in front of *dargahs*, is conſidered very valuable, and water rubbed on it is ſuppoſed to have ſome medicinal virtue; this ſpecies of ſtone is called *Seng-i-Sumák*.

In a handſome ſtreet leading from the eaſtern gate-way of the Citadel to the *Jámi Masjid*, are the remains of a grand ſtate priſon, and a mint. There is alſo a lofty building of three ſtories, with a moſque adjoining it, conſtructed of black ſtone very elegantly carved in ſome places. This was erected by a ſweeper or *mihter*, who muſt have been what this name literally imports, for ſuch a work would not be diſcreditable to a prince. You ſee the ruins of many ſplendid houſes built by *Omrahs* of the court, with adjoining moſques, courts &c. The moſt conſpicuous amongſt them is the manſion of Mustafá Khan, an eminent nobleman in the reign of Álí Á'ádil-Sháh.

The Fort is abundantly ſupplied with water by aqueducts from *Túrwáí*, the *Bégam Táláb*, and other reſervoirs on the ſouthern ſide of it, and by a number of fine Wells, the principal of which have been deſcribed. The *Bégam Tálíb* is now out of order, and moſt of the other tanks were deſtroyed in the laſt reign of this ſovereignty, in order to prevent an enemy from ſitting long before the place.

The dimenſions of the large gun, called *Málic-i Maidán*,(r) or "maſter-of-the-field" are correctly given by Major Moor (s) It was not however, as he ſtates, caſt by Aurengzéb. This immenſe piece of ordnance was made by Rú'mí Khán, a Turkiſh officer of one of the Nizám Sháhs, and fell into the hands of Sultan Mo-á'mmed of *Bíjapúr*, who had engraved upon it in Perſian this

(r) It is of the compoſition called *Puchrupee* or of five metals.
(s) p. 322.

inſcription: "The Prince MUH'AMMED-GHÁZI, in ſplendor like "the ſun, under whoſe ſhade the world ſought a ſhelter. By the "face of his all-deſtroying ſabre, in half the twinkling of an eye, he took "the maſter-of-the-field from NIZÁM SHÁH." This inſcription was eraſed by the order of AURENGZÉB, who had the following one ſubſtituted for it: "SHAH ÂÁLUMGÍR GHÁZÍ, emperor of kings, who "reſtored juſtice and conquered the ſovereigns of the *Dekkan*, re-"duced *Bíjapúr*. Fortune ſmiled on him, and victory exclaimed; "he has ſubdued the maſter-of-the-field." The date of the conqueſt is expreſſed by theſe words ملک میدان را گرفت (t) "he took the maſter-of-the-field" and is "1096 Hijrí." The date cut on the gun is 1097. (u) The neatneſs of the chronogram is a ſufficient excuſe for the miſtake of one year. There is an annual reſort of Hindus to this gun, and it has a few conſtant attendants who place flowers and perfumes in and about it. There is a very ancient but ſubſtantial *Ídgáh* (v) in the fort built by YU'SUF ÂÁDIL SHÁH.

Of the buildings in the Citadel, all are in ruins, except a beautiful little moſque built by ÂLÍ-ÂÁDIL SHÁH. The inſide is of finely poliſhed black granite, very neatly carved, and on the ſides of the *cdbáh*, are ſeveral well executed ſculptures of different moſques. The moſt conſpicuous object here is a lofty edifice called *Heft-Kendee*, or ſeven-ſtories, in one of which is a drawing on the wall of ÂLÍ-ÂÁDIL SHÁH, and RAMBHÁ a dancing-girl. This was part of that SULTÁN's Palace, and the entrance to it is through a grand court 140 yards long by 80 broad. Front of the *Dhobí-Mahl*, another

(t) ملک میدان means literally *King of the Field*, ملک appears here, and in p. 413, to be confounded with مالک which certainly ſignifies, "*maſter*, *owner*, *proprietor*, &c. ED.

(u) A. D. 1688.

(v) Place where the two principal Muh'ammedan *Fêtes* or feaſts are celebrated.

palace, presents to the view three lofty arches; the centre one of which is of extraordinary dimensions. It is 60 feet broad, and 8 deep, and the height appears about 80 feet. Next to this is the *Ánanda Mahl*, which has the appearance from the style in which it is built, of having been the residence of the ladies of the *Haram*. Adjoining this is the *Adawlut-Khanah*, or court-of-justice, situated at the extremity of a court 150 yards long by 80 broad. Here the SULTÁNS were installed, in a balcony projecting from the upper story, where also justice was administered. In front of the building is a large fountain, and at the opposite end of the court is a low range of buildings with a front of 90 arches, in which the UMRÁNS attended in waiting. There is a black stone a few paces before the centre of this arcade, called the *mujrí gáh*, from which the officers of the court used to perform their obeisances. On the right of the front of the *Adawlut Khanah* is the *Sona Mahl*, which, as its name implies, was richly gilded, but now hardly a vestige of this ornament remains. Opposite to the *Sona Mahl*, is the *Secca Mahl*, in which was kept the privy-seal. Beyond this is the *Pání Mahl*, built on the brink of the ditch on the northern side of the Citadel. The upper room is faced with black granite, covered with sculptured inscriptions in the *Tegra*, not one of which I could decypher. From this place the SULTÁNS used to view combats between elephants, their menagerie and hunting establishments, and parties of troops in review order, on a small plain immediately beyond the ditch. After having passed the eastern gateway of the Citadel, you see on entering the Fort on the sides of the road four pillars of black marble, an offering from the widow of RÁMRÁJ to ALÍ-ÁÁDIL SHÁH. One of them is carved, the other plain and circular. Their diameter is one cubit, and they are said to be 15 feet high: but not more than a third of them is seen, the rest being surrounded with a support of stone and mud. On the curtain outside of this gate is a carved representation of the head of RÁMRÁJ, inclining downwards in comma-

moration of the wretched fate of that great potentate, who was beheaded, after having been defeated and taken priſoner in a moſt ſevere battle with the allied armies of the Muhammedan ſovereigns of the *Dekkan*. Âlí Âàdil-Shâh headed the confederacy which decided the fate of the gigantic empire of *Bijnagar*. I neither ſaw nor heard of the equeſtrian ſtatue of Râmráj at *Bijapúr*, which has been mentioned in a former work, though my guide of his own accord pointed out to me the head. Within the Citadel is a very ancient *Pagoda*, from which it would appear that there was a fortreſs here before the Muhammedan invaſion of the *Dekkan*, which partly razed, and partly repaired, improved, and extended, may have conſtituted the work ſaid to have been conſtructed by Yúsuf Âàdil Shâh. The *Pagoda* is built very much in the ſtyle of the rudeſt excavations at *Ellora*, and appears very ancient.

4thly. The moſt conſpicuous amongſt the buildings outſide of the Fort is the *Makbara* of Sultán Ibráhím 2d. On the outſide of the body of the mauſoleum over which the dome is raiſed, the walls are carved into Arabic inſcriptions, ſculptured with great ſkill, and diſpoſed in every variety of ornament. The gilding and enamel, however, is entirely defaced, excepting in a ſmall part of one of the ſides, where its remains give a faint idea of its former luſtre. A perſon looking at the illuminated page of a beautiful oriental manuſcript, magnifying this, and fancying it to be repreſented by ſculpture, painting, and gilding, on the face of a wall of black granite, will have ſome conception of the labour, ſkill, and brilliancy of this work. The whole of the *Korán* is ſaid to be carved on the four ſides of this elegant ſtructure, in which, the utmoſt art and taſte of the architect and the ſculptor have combined to produce the richeſt effect. This beautiful building with it's moſque was erected by Ibrahím for his deceaſed daughter, Zuhrah (*w*) Sultán, and on his death,

(*w*) Venus.

his remains were depoſited here. It has unfortunately ſuſtained ſome injury from the ſhot of that extraordinary gun "the *Maſte-i-maidán*", which were directed againſt the tents of AURENGZÉB, who firſt encamped, a little beyond the tomb. Among the numerous edifices in the old city are a good caravanſara conſtructed by MUSTAFÁ KHAN, and a ſtill more lofty one of two ſtones, of which only one face remains, built by a *Sáhúkár* or Banker, both ſituated in *Shahpúra*. In theſe times *Sáhúkárs*, living under native governments, do not perpetuate their memory by public works of this kind, but live in ſmall houſes, and move about in mean equipages, and in ſhort do every thing to conceal the real amount of their wealth, which, if diſplayed, might poſſibly become the prey of their rapacious governors. Near theſe caravanſaras is the *dargah* (x) of *Amín-o-dín-u-ala*, ſituated on a riſing ground, and one of the neateſt places of this deſcription I have ever ſeen. This man came from *Bukhára* to the court of SULTÁN MUH'AMMED, and died in the reign of SECANDER in 1086 Hijrí, ſculptured above the door of the *dargah*. MOOR makes rather a ridiculous miſtake about the meaning of the word, *Khaujah*, which is applied very commonly to theſe holy perſonages, and ſignifies lord or maſter. I was very politely received here by the *Sajjádah Neſhín*, or ſuperior of the *dargah*, SAIYÍD-MUH'AMMED HUSAINÍ, a lineal deſcendant of the KHAUJAHS, whoſe appearance is more worldly than devout. The ſtriking contraſt between the honors paid to the memory of theſe devotees, and the neglect ſhewn to that of kings, is obſervable throughout *India*. The principal edifice in *Afzalpúra*, is the handſome tomb of AFZAL-KHAN SHIRAZÍ, one of the principal nobles in the court of ÂLÍ ÂÁDIL SHÁH, and a diſciple of CHINGÍ SHÁH's, whoſe *dargah* is near his pupil's tomb. CHINGÍ SHÁH was a follower of the celebrated SHÁH-MADÁR, the founder of a ſect of *fakirs*. All thoſe who lead about tigers, bears, and mon-

(x) Name applied to the tombs of Saints and Religious perſonages.

kies are of this ſect, the followers of which are perhaps the moſt diſſolute and vagabond of all Muſſammedans. SHAH MADAR is buried at *Makanpúr*, and a hoſt of pilgrims annually reſort to his tomb from all parts of *Hindooſtan*. The *Makanpúr-cá-Mélá* as it is called, is perhaps the moſt numerous and moſt celebrated of all pilgrimages or rather fairs, in *Hindooſtan*.

ALL the tombs and moſques which have been deſcribed, were ſumptuously endowed in the time of the kings of *Bijapúr*. Theſe endowments were, however, very much curtailed by AURENGZEB, who ſettled the following maintenance for the ſupport of their eſtabliſhments.

FOR the royal tombs, a daily allowance of 5 rupees to the attendants, and 2 rupees for the expence of lamps, perfumes and flowers.

THE *Jámi Maſjid*, 2 rupees per diem.

THE ancient *Idgah* 1 rupee per diem, to the *Muazzin* or public crier, at the *Íds*.

THE *Idgah* outſide of the Fort, built by the emperor, half a rupee per diem.

THE *Áſár i Sharíf* ¼ of a rupee per diem, beſides 2 rupees to the *Mutawalli* or principal attendant.

THE *Dargah* of *Amín o dín-i-Ala* 2,200 rupees from the annual collections in the City, and ſome villages in the diſtrict, producing a revenue of 15,000 Rupees. There are a number of inferior places, which have ſmall endowments. All the edifices which have been deſcribed, have not a particle of wood in them, but are built entirely of granite, finely poliſhed, and ſo neatly put together, that it is ſcarce per-

ceptible where the ſtones join. Every houſe in the Fort and City is built of ſtone. The ſtyle of architecture here is much ſuperior to any ſpecimen, that I have ſeen in *India*. The domes, arches and minarets, and the ornamental work, are all executed in the beſt taſte, and really preſent fine ſpecimens of the art. The gilding and enamel is very much in the Perſian ſtyle; and there are ſome buildings, which appear to be conſtructed after the Turkiſh faſhion. It will be recollected, that the ſovereigns of this court were of Turkiſh deſcent, and that the greateſt part of the nobility were Turks, Perſians, and Tartars. There were alſo many foreign artiſts in the ſervice of the Court, who no doubt introduced the ſtyle of building and decoration prevalent in their own countries. FERISHTA relates, that the firſt SOLTÁN-YÚSUF-ÂÀDIL SHÁH invited many eminent artiſts, "from *Perſia*, *Tartary*, and *Turkey*, to his court, and made them "eaſy under the ſhade of his bounty; and that his ſucceſſor ISMAEL, "was himſelf a complete artiſt in painting and varniſhing." Theſe two SULTÁNS, with the 3d. IBRÁHIM, were buried at *Gooké*, about 6 Coſs from *Sholapúr*.

I regret that I am unable to render the preceding deſcription more intereſting by deſigns of the principal buildings, and by copies of inſcriptions, which on many accounts are valuable. The object of this imperfect account, is to attract the traveller and the artiſt to this noble City, before the rapid progreſs of dilapidation ſhall have left only the veſtiges of it's ancient grandeur. The one will here find a wide field for obſervation and reflection, and the other will have full ſcope to the employment of his pencil; and ſhould the public hereafter be favored, with a more accurate deſcription of *Bijapúr*, and with repreſentations of it's moſt elegant ſtructures, I ſhall be happy in having contributed by this humble effort to reſcue from oblivion, the ſtill ſplendid remains of one of the moſt magnificent Cities of *India*.

5thly. For an account of the origin and progress of the sovereignty of *Bijapúr*, Ferishta may be consulted with great advantage.—That interesting writer brings his History of this dynasty down to the end of the reign (y) of Ibráhim Âádil Sháh, 2d. (z) Of the subsequent reigns, embracing a period of sixty years, until the conquest of *Bijapúr*, by the Imperial arms, we have no satisfactory account; for the meagre epitome in the *Looboo-Towareekh*, (a) scarcely excites curiosity. A History of the reign of Sultán Muh'ammed, written after the plan of Ferishta's work, would be interesting, as the latter part of it would exhibit the causes of the decline of this monarchy, which, however, preserved its splendor during the greatest part of that Prince's government.—At *Bijapúr*, you hear more of Sultán-i-Muhmood, than all his predecessors; and though the predilection for his name may, in some degree, arise from his being the last independent sovereign and the best known of the Âádil Sháhs, still all concur in giving him a most amiable character, and in extolling his justice, and his munificence. The successors of the Imperial armies, and the extension of their conquests in the *Dekkan*, gave a vital blow to the interest of it's several independent sovereignties. Muh'ammed Âádil Sháh, about the year 1650 A. D. was compelled to become tributary to the emperor Sháh Jehan, and at the close of his reign, the authority of Muh'ammed was still further weakened by the successful rebellion of Sevají. In the reign of his successor, the foundations of the monarchy were completely subverted, and Sevají, after having treacherously assassinated the general of Álí Âádil-Sháh, and twice defeated his troops, usurped the greatest part of his dominions. Álí Âádil-Sháh died in 1672 A. D. leaving a nominal kingdom to his infant son Secander; and in 1685, *Bijapúr*, with it's few

(y) A. D. 1626.
(z) This Prince reigned 47 years.
(a) The Essence of Histories.

remaining dependencies, was reduced to the imperial yoke by Âlumgír.

The 2d. volume of Scott's History of *Dekkan*, from p. 35 to 53, and from p. 69 to 73, contains a detailed account of the reign of Secander Ââdil Shâh, of the operations of the Imperial troops againſt the kingdom of *Bijapûr* before the arrival of the emperor in the *Dekkan*, and of the ſiege and conqueſt of *Bijapûr* by Aurengzéb. But the date of the conqueſt, as repreſented in that account of his operations in the *Dekkan*, is incorrect; for, by the inſcription on that immenſe gun, the "*Malic-i Maidân*," the true date is aſcertained to be 1097 A. H. or 1685 A. D. which is alſo given in the *Looboo Towareekh*, as the year in which *Bijapûr* ſurrendered to the Imperial army. All the Perſian hiſtories, which I have conſulted on this ſubject, are ſilent reſpecting the fate of Secander; but, from the verbal accounts of the beſt informed perſons at *Bijapûr*, it appears that he was put to death by Âlumgír, a few months after he ſurrendered himſelf to that emperor. When he firſt waited upon him, he carried upon his head the *Âſâr-i-Sharif*, but theſe holy relics did not ſave him from deſtruction. Aurengzéb, having diſcovered, or having pretended to diſcover, that his royal captive was engaged in a conſpiracy with Sevají, put an end to his exiſtence by having poiſon adminiſtered to him in a melon, or as ſome ſay, by having him cruſhed to death between two boards. I heard at *Bijapûr*, an anecdote of a converſation which paſſed between Aurengzéb, and his daughter, the Begum, whoſe ſepulchre has been deſcribed, which is perhaps worth relating. On the fall of the place, the emperor was boaſting to her of the ſucceſs with which Providence had crowned his arms in every quarter, and of his having by the extinction of this ſovereignty accompliſhed every object of his ambition, and ſubdued and dethroned

every powerful king in Hindoſtan, and the *Dekkan*. The Begum obſerved, "your majeſty, it is true, is the conqueror of the world, (*b*) "but you have departed from the wiſe policy of your illuſtrious "anceſtors, who, when they ſubdued kingdoms, made the poſſeſſors "of them their ſubjects and tributaries, and thus became kings of "kings; (*c*) while you are now only a ſimple king, without royal ſub- "jects to pay you homage, and to give you a claim to that enviable "title." Aurengzéb was forcibly ſtruck with the juſtice of this remark, which occaſioned him ſo much uneaſineſs, that he could not refrain from expreſſing his diſpleaſure at the delivery of ſentiments ſo hurtful to his vanity. When Aurengzéb took *Bijapúr*, he gave it the name of "*Dar-oo Zuffur*. (*d*)

The Emperor's ſon, Muhammed Kam Bukhsh, was appointed to the government of *Bíjapúr*, 1707 A. D. In this eventful year, Aurengzeb died, and his ſons contended for the empire. Kám Bukhsh on his arrival at *Bíjapúr*, aſſumed the imperial titles, proclaimed the *Khootba*, and ſtruck coins in his own name. Fortune, however, favored the arms of Sháh-Alum, who having vanquiſhed all the competitors for *Bíjapúr*, remained under the imperial authority until the year 1724 A. D. the epoch of the eſtabliſhment of Nizám-Ool-Moolk's independence in the *Dekkan*. It was held by his ſucceſſors till 1760, when Nizam-Ulee-Khan, having been completely defeated by the Peshwa Balajee-Bajee-Rao, purchaſed a peace by ceding to the Marhattas the *Soobah* of *Bíjapúr*, with other forts and diſtricts, yielding an annual revenue of 60,00,000 rupees. From that period, the Marhattas have retained poſſeſſion of this Fort, and it's dependencies.

(*b*.) Áálumgír, the name by which Aurengzéb is generally called in *India*.
(*c*) Shâhun Shâh.
(*d*) The Place of Victory.

It is difficult now to aſcertain the amount of revenue produced in the dominions of the independent Sovereigns of *Bijapúr*. The groſs revenue of their territories, according to the *Jumma-Bundee* (*e*) eſtabliſhed by AURENGZE'B, was 7,88,80,000 rupees. The military force maintained by SULTÁN MUH'AMMED, amounted to 1,80,000 horſe; and in the time of his ſucceſſor ÁLÍ ÁÁDÍL-SHÁH 2d, to 80,000.

Beejapúr as it was, and *Bijapúr* as it is, are two very different places. The City is a maſs of ruins, as well as the inſide of the Fort, which itſelf is ſo injured, that in one or two places in it's eaſtern face, you can aſcend from the ditch to the rampart. In ſhort, nothing now remains but the durable monuments of it's ancient grandeur. What is now called the *Soobah* of *Bijapúr*, is only one of it's former *ſircars* or diſtricts, which produced in the time of ÁÁLUMGÍR 24,00,000 rupees, derived from the *huwéli*, (*f*) or capital, and 29 *pergunnahs* dependent on it. But this diſtrict has been diſmembered under the MARHATTA government, and it's dependent *pergunnahs* now compoſe ſeveral diſtinct *Jagírs*. One of theſe is the City and its dependent villages *(huwéli)* of *Bijapúr*, containing 32 villages under the City, held in *Jagir* by GOKLA, one of the principal military chieftains under the PESHWA's government. The *huwéli* with it's dependencies, produced, in the time of ÁÁLUMGÍR, upwards of 5,00,000 rupees; and under the MARHATTAS, about twenty years ago, one lac. It's preſent revenue, I underſtand, is between 30 and 40,000 rupees, about a fourth of which is *ſaer* (*g*), and the reſt *mál*, or territorial produce; and this diminution in the revenue is the conſequence of a bad adminiſtration of the country, the greateſt part of which is now deſolate.

(*e*) Rental.
(*f*) City and its dependent Villages.
(*g*) Impoſts.

The fort has now only 50 *sibundies* (*h*) for its garrison, and the *Aumil* (*i*) maintains a hundred. About 3,500 rupees are distributed from the revenues of the district, among the *Muhammedan* attendants, at the different tombs and mosques, which have been described, and will be considered rather a liberal allowance from a *Hindoo* government, for the maintenance of a religious class of people of a different persuasion.

Bijapúr is situated in N. lat. 17°.9. and E. long. 75°.42. The country is open in its immediate neighbourhood, and the climate is said to be salubrious.

(*h*) Irregular matchlockmen.
(*i*) Collector.

XIV.

Essay on the Binomial Theorem; as known to the Arabs.

By J. TYTLER, Esq.

Communicated by R. TYTLER, M. D.

FOR a long time it was imagined that the diſcovery of the law which determines the coefficients of the terms of the powers of a Binomial Root, commonly called the Binomial Theorem, was entirely owing to SIR ISAAC NEWTON. My preſent diſtance from books and other ſources of information compels me, in proof of this, to refer to ſo common a work, as JOHN WARD's Popular Introduction to Mathematics. He explains the Theorem, in part II. chap. 2 § 5, and concludes with theſe words: "Now from theſe conſiderations it was, that I propoſed this method of raiſing powers in my Compendium of Algebra, page 51, as wholly new (viz. ſo much of it as was there uſeful), having then (I profeſs) neither ſeen the way of doing it, nor ſo much as heard of its being done. But, ſince the writing of that tract, I find in Dr. WALLIS's

Hiſtory of Algebra, page 319 and 331, that the learned Sir ISAAC NEWTON had diſcovered it long before: which the doctor ſets down in this manner:

Let m be the exponent of the power;

Then $\left\{ 1 \times \frac{m-0}{1} \times \frac{m-1}{2} \times \frac{m-2}{3} \times \frac{m-3}{4} \times \frac{m-4}{5} \text{ &c.} \right.$

will be the ſeries of the Unciæ required; but he doth not tell us how they firſt came to be found out, nor have I met with the leaſt hint of it in any author."

THOMAS SIMSON, alſo, in the 6th ſection of his Algebra, attributes it without any heſitation to Sir ISAAC NEWTON. At laſt, the late Dr. HUTTON, in the 77th page of the Introduction to his excellent Mathematical Tables, edition IVth, ſhowed that this Theorem, as far as relates to integers, was known before the time of Sir ISAAC, and that his merit conſiſted in the extenſion of it to fractions. The paſſage is not very long, and will ſave the trouble of a reference, and bring the whole ſubject at once before the reader; I ſhall therefore tranſcribe it.

"FOR aſſigning the coefficients of the terms in the multiple expreſſions, our author (BRIGGS) here delivers the conſtruction of figurate or polygonal numbers, inserts a large table of them, and teaches their several uſes; one of which is, that every other number, taken in the diagonal lines, furniſhes the coefficients of the terms of the general equation by which the ſines and chords of multiple arcs are expreſſed, which he amply illuſtrates; and another, that the ſame diagonal numbers conſtitute the

coefficients of the terms of any power of a Binomial; which property was also mentioned by VIETA, in his Angulares Sectiones, Theor. 6, 7; and, before him, pretty fully treated of by STIFELIUS, in his Arithmetica Integra, fol. 44 and seq.; where he inserts and makes the like use of such a table of figurate numbers, in extracting the roots of all powers whatever. But it was perhaps known much earlier, as appears by the treatise on figurate numbers by NICOMACHUS, (see MALCOLM's History, p. XVIII.) Though indeed, CARDAN seems to ascribe this discovery to STIFELIUS. See his Opus Novum de Proportionibus Numerorum, where he quotes it, and extracts the table and its use from STIFEL's book. CARDAN, in p. 135, &c. of the same work, makes use of a like table to find the number of variations or conjugations, as he calls them. STEVINUS, too, makes use of the same coefficient and method of roots as STIFELIUS. (See his Arith. p. 25.) And even LUCAS DE BURGO extracts the cube root by the same coefficients, about the year 1470. But he does not go to any higher roots. And this is the first mention I have seen of this law of the coefficients of the powers of a Binomial, commonly called Sir J. NEWTON's Binomial Theorem; although it is very evident that Sir ISAAC was not the first inventor of it. The part of it properly belonging to him, seems to be, only the extending it to fractional indices, which was indeed an immediate effect of the general method of denoting all roots like powers with fractional exponents, the Theorem being not at all altered. However, it appears, that our author BRIGGS was the first who taught the rule for generating the coefficients of the terms, successively one from another, of any powers of a Binomial, independent of those of any other power. For having shewn, in his

Abacus Παγχρηστος (which he ſo calls on account of its frequent and excellent uſe, and of which a ſmall ſpecimen is here annexed,) that the numbers in the diagonal directions, aſcending from right to left,

Abacus ΠΑΓΧΡΗΣΤΟΣ.							
H −(8)	G −(7)	F +(6)	E +(5)	D −(4)	C −(3)	B +(2)	A (1)
9	8	7	6	5	4	3	2
	36	28	21	15	10	6	3
		84	56	35	20	10	4
			126	70	35	15	5
				126	56	21	6
					84	28	7
						36	8
							9

are the coefficients of the powers of Binomials, the indices being the figures in the firſt perpendicular column *A*, which are alſo the coefficients of the 2d terms of each power, (thoſe of the firſt terms being 1, are here omitted); and that any one of theſe diagonal numbers is in proportion to the next higher in the diagonal, as the vertical of the former is to the marginal of the latter; that is, as the uppermoſt number in the column of the former is to the firſt or right hand number in the line of the latter. Having ſhewn theſe things, I ſay, he thereby teaches the generation of the coefficients of any power, independently of all other powers, by the very ſame law or rule which we now uſe in the Binomial Theorem. Thus, for the 9th power; 9 being the coefficient of the 2d term, and 1 always that of the 1ſt, to find the 3d coefficient, we have 2 : 8 :: 9 : 36; for the 4th term, 3 : 7 :: 36 : 84; for the 5th term, 4 : 6 :: 84 : 126; and ſo on for the reſt. That is to ſay, the coefficients in the terms in any power *m*, are inverſely as the vertical numbers or firſt line 1, 2,

3, 4, ...m, and directly as the aſcending numbers m, $m-1$, $m-2$, $m-3$, ... 1, in the firſt column A; and that conſequently thoſe coefficients are found by the continual multiplication of theſe fractions $\frac{m}{1}$, $\frac{m-1}{2}$, $\frac{m-2}{3}$, $\frac{m-3}{4}$, ... $\frac{m}{1}$, which is the very Theorem as it ſtands at this day, and as applied by NEWTON to roots or fractional exponents, as it had before been uſed for integral powers. This Theorem then being thus plainly taught by BRIGGS about the year 1600, it is ſurpriſing how a man of ſuch general reading as Dr. WALLIS was, could poſſibly be ignorant of it, as he plainly appears to be by the 85th chapter of his Algebra, where he fully aſcribes the invention to NEWTON, and adds, that he himſelf had formerly ſought for ſuch a rule but without ſucceſs; or how Mr. JOHN BERNOUILLI, not half a century ſince, could himſelf firſt diſpute the invention with NEWTON, and then give the discovery of it to M. PASCAL, who was not born till long after it had been taught by BRIGGS. See BERNOUILLI's *works, vol.* 4. *pa.* 173. But I do not wonder that BRIGGS's remark was unknown to NEWTON, who owed almoſt every thing to genius and deep meditation, but very little to reading: and I have no doubt that he made the diſcovery himſelf, without any light from BRIGGS, and that he thought it was new for all powers in generals, as it was indeed for roots and quantities with fractional and irrational exponents."

THUS far Dr. HUTTON. Mr. REUBEN BURROWS in the IId volume of the Asiatic Reſearches, Appendix No. V. ſuſpects that this rule was known to the *Hindus*. I am now about to ſhow, that it was alſo known to the *Arabians*. It is to be found in two of their Arithmetical books

viz. the *Mifteh-ul-Hifab*, or key of Arithmetic, compoſed by JUMSHID BEN MUSAOUD in the reign of ULUGH BEG, grandſon of TIMUR, and in the *Ayoun-ul-Hifab*, or rules of Arithmetic, compoſed by MUHAMMED BAQIR in the reign of SHAH ABBAS I, about the year 1600. Neither of theſe works is very generally to be met with, at leaſt in that part of *India* where I am ſtationed; and I have not as yet been able to procure more than an extract of each. The author of the *Mifteh-ul-Hifab* declares (I am told) that his rule is not invented by himſelf, but taken from authors more ancient ſtill. His rule is much more complicated than that in the *Ayoun-ul-Hifab*, and preſuppoſes an acquaintance with former parts of the work, which are not in my poſſeſſion. I do not therefore tranſcribe that, but proceed to give the rule as it ſtands in the *Ayoun-ul-Hifab*, premiſing that the coefficients of the terms are called the اصول منازل of the power, which I have tranſlated Radices Locorum; and the firſt power of a number, that is, the number itſelf conſidered as a root, is called the ضلع or ضلع اول which I have, in like manner, tranſlated Latus or Latus Primum.

اعلم ان اصول منزلة كل مضلع هي اعداد بازاء الضلع الاول والمضلعات السابقة عليه وطريق في استخراجها ان تثبت اسامي المضلع والمضلعات السابقة على المضلع المفروض مرتبة في سطر طولي و تاخذ عدد منزلة ذلك المضلع و تضعه بازاء ضلع ثم تنقص منه واحدا و تضرب نصف ما بقي فيما وضع بازاء الضلع اوبالعكس و تضع الحاصل بازاء المال ثم تنقص منه اثنين و تضرب ثلث الباقي فيما وضع بازاء المال اوبالعكس و تضع الحاصل بازاء الكعب ثم تنقص منه ثلثة و تضرب ربع الباقي فيما وضع بازاء الكعب اوبالعكس و تضع الحاصل بازاء مال المال وهكذا الي ان ينتهي ولا محالة يقع بازاء كل شيئين متقابلين من الحواشي الى الوسط او الوسطين عدد واحد فان شيئت فارسم اولا بازاء الاخير وما قبله ايضا ما ترسمه بازاء الضلع وبازاء المال وهكذا

الى ان يتم مثاله اردنا ان نستخرج اصول منزلة كعب كعب كعب الكعب كذبنا الضلع الى مال كعب كعب الكعب كما مر ورسمنا ١٢ وهو عدده منزلة الضلع بازاء الضلع والاخير ونقصنا منه واحدا وضربناه في نصف ١٢ ورسمنا ٦٦ الحاصل بازاء المال وماقبل الاخير ونقصنا منه اثنين وضربنا العشرة الباقية في ثلث مارسم بازاء المال ورسمنا الحاصل وهو ٢٢٠ بازاء الكعب ونظيره ثم نقصنا منه ثلثة وضربنا التسعة الباقية في ربع ما بازاء الكعب ورسمنا الحاصل وهو ٤٩٥ بازاء مال المال ونظيره ثم نقصنا منه اربعة وضربنا الثمانية الباقية في خمس ما بازاء مال مال ورسمنا الحاصل وهو ٧٩٢ بازاء مال الكعب ونظيره ثم نقصنا منه خمسة وضربنا السبعة الباقية في سدس ما بازاء مال الكعب ورسمنا الحاصل وهو ٩٢٤ بازاء كعب الكعب فهذه الاعداد المرسومة اصول منزلة كعب كعب كعب الكعب وهذه صورته

اعداد اصول منازل	آنا مي ضلع وضلعات سابقه ضلع مظلوبه
١٢	ضلع
٦٦	مال
٢٢٠	كعب
٤٩٥	مال مال
٧٩٢	مال كعب
٩٢٤	كعب كعب
٧٩٢	مال مال كعب
٤٩٥	مال كعب كعب
٢٢٠	كعب كعب كعب
٦٦	مال مال كعب كعب
١٢	مال كعب كعب كعب

فهذا المصلع من كل عدد مساو للمجموع هذين المضلعين لقسميه واثنى عشر مثلا لكل من القسمين في مال كعب كعب كعب الاخر وستة وستين مثلا مال كل منهما في مال مال كعب كعب الاخر وما لين وعشرين مثلا لكعب كل منهما في كعب كعب كعب الاخر واربعمائة ماية وخمسة وتسعين مثلا مال مال كل منهما في مال كعب كعب الاخر وسبعمائة واثنين وتسعين مثلا مال كعب كل منهما في مال مال كعب الاخر وتسعمائة واربعة وعشرين مثلا لكعب كعب احدهما في كعب كعب الاخر وعلى هذا القياس غيره

" Obſerve that the Radices Locorum of each power are numbers which are placed oppoſite the Latus Primum, and the preceding powers (i. e. the powers whoſe Indices are leſs than that of the power whoſe Radices Locorum or coefficients are required), and the method of diſcovering them is as follows:—Let the names of the Latus, and of the power preceding or lower than the given one, be written in a row of length (i. e. in a row from the top to the bottom of the page), and take the number of the index of this given power, and place it oppoſite to the name of the Latus, then ſubtract from it, and multiply $\frac{1}{2}$ of the remainder into the number which is placed oppoſite the Latus, or the contrary, (i. e. or multiply the remainder into half of that which is placed oppoſite the Latus), and place the product oppoſite the name of the ſquare, then ſubtract 2 from it (viz. from the index of the given power), and multiply $\frac{1}{3}$ of the remainder into that which is placed oppoſite the ſquare or the contrary, and place the product oppoſite the cube, then ſubtract 3 from it, and multiply $\frac{1}{4}$ of the remainder into that which is placed oppoſite the cube or the contrary, and place the product oppoſite the biquadrate, and ſo on to the end, and

then by a neceſſary conſequence the ſame number will be found in every place, which is equally diſtant from the middle or the two middle ones; therefore, if you chuſe it, write the firſt found figure, alſo in the laſt place, (i. e. in the preſent inſtance) that which is written oppoſite the Latus and ſquare may be written oppoſite the biquadrate and cube, and ſo on till it be completed. For example, let it be required to find the Radices Locorum of the cubris cubi cubi cubi. Let us write from the Latus to the quadratics cubi cubi cubi as was directed, and let us write 12 which is the index of the given power oppoſite the Latus and the laſt place, and ſubtract 1 from it, and let us multiply it into the $\frac{1}{2}$ of 12, and write 66 the product oppoſite the ſquare and the penultimate place, then ſubtract 2 from it, and multiply 10, which is the remainder, into $\frac{1}{3}$ of what was written oppoſite the ſquare, and write the product, which is 220, oppoſite the cube and that place which agrees with it (i. e. which is equally diſtant from the middle on the other ſide), then ſubtract 3 from it, and multiply 9 the remainder into $\frac{1}{4}$ of that which is oppoſite the cube, and write the product, which is 495, oppoſite the biquadrate and that which agrees with it, then ſubtract 4 from it, and multiply 8, the remainder, into $\frac{1}{5}$ of that which is oppoſite the biquadrate, and write the product, which is 792, oppoſite the quadratics cubi and that which agrees with it, then ſubtract 5 from it, and multiply 7 the remainder into 16th of that which is oppoſite the quadratics cubi, and write the product, which is 924, oppoſite the cubris cubi, and then theſe num-

bers, ſo written, are the Radices Locorum of the cubris cubi cubi cubi, of which this is the table.

Names of the Powers preceding the given Power.	*Numbers of Radices Locorum.*
Latus	12
Square	66
Cube	220
Biquadrate	495
Quadratics cubi	792
Cubris cubi	924
Quadratics quadrati cubi	792
Quadratics cubi cubi	495
Cubris cubi cubi	220
Quadratics quadrati cubi cubi	66
Quadratics cubi cubi cubi	12

Hence then this power of every number is equal to the ſum of the powers of its two parts, and 12 times each of theſe two parts multiplied into the quadratics cubi cubi cubi of the other; and 66 times the ſquare of each of them into the quadratics quadrati cubi cubi of the other; and 220 times the cubi of each of them into the cubris, cubi cubi of the other; and 495 times the biquadrate of each of them into the quadratics cubi cubi of the other; and 792 times the quadratics cubi of each of them into the quadratics quadrati cubi of the other; and 924 times the cubris cubi of one of them into the cubris cubi of the other, and ſo of other caſes."

FROM this very clear rule it plainly appears, that whatever may have been the caſe in *Europe*, yet long before the time of BRIGGS the *Arabians* were acquainted with "the rule for generating the coefficients of the terms ſucceſſively one from another, of any power of a Binomial independently of thoſe of any other power;" and thus proof is added to the many others, that *Muſulmans*, before the ſtimulus of *Muhammed's* newly imbibed doctrines had ceaſed and their narcotic effects began to appear, were much ſuperior in ſcience to contemporary Chriſtians.

IT is but juſtice that I ſhould add, that my firſt knowledge of this rule was obtained from the *Khazanut-ul Ilm*, which is a complete ſyſtem of Arithmetic, Algebra, and Geometry, as far as known to the *Arabians* and *Hindus*, compoſed in the preſent day by KHAN JEE, a moſt intelligent inhabitant of *Patna*. On my requeſting to know from what original authors the rule was taken, this gentleman was kind enough to favour me with the above extract. No more I think is required to demonſtrate, that his own work highly deſerves tranſlation and publication.

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THE following is an abſtract of the Rules of this Inſtitution, which are now in force, including thoſe printed in the Appendix to the ſixth and ſubſequent Volumes of the Society's Tranſactions:

Original Rules, adopted from the Founder's diſcourſe, 15th February 1784.

1. THAT the inſtitution be denominated the *Aſiatick Society:* that the bounds of its inveſtigations be the geographical limits of *Aſia;* and that [illegible] confined to whatever is perfect

2. That weekly meetings be held for the purpoſe of hearing original papers read, on ſuch ſubjects as fall within the circle of the Society's enquiries.

3. THAT all curious and learned men be invited to ſend their tracts to the Secretary; for which they ſhall immediately receive the thanks of the Society.

4. THAT the Society's researches be published annually, if a sufficiency of valuable materials be received.

5. THAT mere translations of considerable length be not admitted, except of such unpublished essays or treatises as may be transmitted to the Society, by native authors.

6. THAT all questions be decided on a ballot, by a majority of two-thirds, and that nine Members be required to constitute a Board for such decisions.

7. THAT no new Member be admitted who has not expressed a voluntary desire to become so; and in that case, that no other qualification be required, than a love of knowledge, and a zeal for the promotion of it.

Subsequent resolutions of the Society, which are in force.

8. THAT the future meetings of the Society be held on the first *Wednesday* of each alternate month; viz. in the months of *February*, *April*, *June*, *August*, *October*, and *December*, at nine o'clock in the evening.

9. THAT if any business should occur to require intermediate meetings, they may be convened by the President; who may also, when necessary, appoint any other day of the week, instead of *Wednesday*, for the stated meetings of the Society.

10. THAT as it may not always be convenient for the President

to attend the meetings of the Society, a certain number of Vice Presidents be elected annually.

11. THAT in case the President and the Vice Presidents should be absent at any meeting, a quarter of an hour after the fixed time, the Senior Member present shall take the chair for the evening.

12. THAT every Member of the Society have the privilege of introducing, as a visitor, any gentleman who is not usually resident in *Calcutta*.

13. THAT with a view to provide funds for the necessary expences of the Society, an admission fee be established, to consist of two gold mohurs, payable by every Member on his election; and that each Member of the Society, resident in India, (honorary Members excepted,) do also contribute a gold mohur quarterly, in the first week of *January*, *April*, *July*, and *October*. Any Member neglecting to pay his subscription, for half a year after it becomes due, to be considered as no longer a Member of the Society.

14. THAT a Treasurer ~~be appointed.~~

15. THAT in addition to the Secretary, an Assistant Secretary, and a Librarian, be also appointed.

16 THAT a Committee of Papers be appointed, to consist of the President, Vice Presidents, Secretary, and nine other Members, to be elected annually; and that any number not less than five, be competent to form a Committee.

17. THAT this Committee [illegible] papers communicated to the Society, such as [illegible] publication, and superintend the printing of the Society's Tranſactions.

18. THAT the Committee of papers be authorized to draw upon the Treaſurer for any ſums requiſite to defray the expence of publiſhing the Tranſactions, and that an order, ſigned by a majority of the Committee, be a ſufficient warrant to the Treaſurer for paying the ſame.

19. THAT the Committee of Papers be authorized to defray any ſmall contingent expences on account of the Society, which they may deem indiſpenſable.

20. THAT the agents of the Society in *England* be deſired to purchaſe and forward for the Society's Library, books of ſcience and oriental literature publiſhed *in Europe*, taking care, that thoſe purchaſes at no time exceed the funds ariſing from the ſale of the Society's publications.

21. THAT the Committee of Papers be requested to correſpond with the Agents in *Europe*, with reſpect to [illegible] requiſite for their guidance in the ſelection of books proper to be added to the Library of the Society.

22. THAT it will be proper to publiſh, with each volume of the Reſearches, a liſt of ſuch oriental ſubjects as may be conſidered in the light of *deſiderata*, to be prepared by the Committee, from liſts, ſubmitted to the Society, by the Members or others.

23. THAT as a teſtimonial to the merit of the beſt papers, commu-

nicated to the Society, on the ſubjects propoſed as *à fiderata*, the author, when not a Member of the Society, be preſented with the volume of Reſearches, wherein ſuch paper is contained, accompanied with a complimentary letter from the Secretary, in the name of the Society.

24. THAT every ſubſcribing Member of the Society be, on application, furniſhed with a copy of the 12th volume, as well as of any future volumes of the Society's Tranſactions, in return for his contributions, without any further payment.

25. THAT with a view to the more general circulation of the *Aſiatick* Reſearches in *India*, the price of the 12th and future volumes, to non ſubſcribers, be fixed at a gold mohur; and that if ſeveral volumes of different years be purchaſed together, they be ſold at ten rupees each.

MUSEUM.

26. On the 2d *February* 1814, the Society determined "upon forming a Muſeum for the reception of all articles that may tend to illuſtrate oriental manners, and hiſtory; or to elucidate the particularities of nature or art in the Eaſt." The following reſolutions were at the ſame time paſſed upon the ſubject;

27. THAT this intention be made known to the public, and that contributions be ſolicited, of the undermentioned nature:

1. Inſcriptions on ſtone or braſs.
2. Ancient monuments, *Muhammedan* or *Hindu*.
3. Figures of the *Hindu* deities.
4. Ancient coins.

5. Ancient manuſcripts.
6. Inſtruments of war, peculiar to the Eaſt.
7. Inſtruments of muſic.
8. The veſſels employed in religious ceremonies.
9. Implements of native art and manufacture, &c. &c.
10. Animals peculiar to *India*, dried or preſerved.
11. Skeletons or particular bones of animals peculiar to *India*.
12. Birds peculiar to *India*, ſtuffed or preſerved.
13. Dried plants, fruits, &c.
14. Mineral or vegetable preparations in Eaſtern pharmacy.
15. Ores of metals.
16. Native alloys of metals.
17. Minerals of every deſcription, &c. &c.

28. THAT the names of perſons contributing to the Muſeum or Library of the Society, be hereafter publiſhed at the end of each volume of the *Aſiatick* Reſearches.

29. THAT the hall on the ground floor of the Society's houſe, be fitted up for the reception of the articles that may be procured; the plan and expences of ſo doing, to be regulated by the Committee of Papers and Secretary, and the perſon under whoſe Superintendence the Muſeum may be placed.

30. THAT the expence which may be incurred in preparing materials, furniſhed in a ſtate unfit for preſervation, be defrayed by the Society, within a certain and fixed extent.

31. THAT the thanks of the Society be given to Doctor WALLICH for the tender of his ſervices; and that he be appointed Superintendent of the Oriental Muſeum of the *Aſiatick* Society.

32. On the 5th *April* 1815, in conſequence of Doctor WALLICH's being obliged to reſide at ſome diſtance from *Calcutta*, it was reſolved, at his ſuggeſtion, to appoint a joint Superintendent of the Society's Muſeum, and Mr. WILLIAM LLOYD GIBBONS, who is alſo Aſſiſtant Secretary and Librarian to the Society, was accordingly requeſted to act as joint Superintendent with Doctor WALLICH.

33. On the 7th *June* 1815, the Superintendents of the Muſeum were requeſted "to return the thanks of the Society to the perſon from whom any donation to the Muſeum has been received, and to make ſimilar acknowledgments for any contribution which may be hereafter made to the Muſeum."

BIBLIOTHECA ASIATICA.

THE following reſolutions were paſſed, on the recommendation of the Committee of Papers, under date the 2d *July* 1806. But materials have not yet been received for publiſhing a volume of the work therein propoſed.

34. THAT the Society publiſh, from time to time, as their funds will admit of it, in volumes diſtinct from the *Aſiatick* Reſearches, tranſlations of ſhort works in the *Sanſcrit* and other *Aſiatick* languages, or extracts and deſcriptive accounts of books of greater length in thoſe languages, which may be offered to the Society, and appear deſerving of publication.

35. THAT as this publication may be expected gradually to extend to all *Aſiatick* books, of which copies may be depoſited in the Library of the Society, and even to all works extant in the learned languages of *Aſia*;

the ſeries of the volumes be entitled *Bibliotheca Aſiatica*, or a deſcriptive catalogue of *Aſiatick* books, with extracts and tranſlations.

36. THAT the Committee of Papers, adopt ſuch means as may appear proper, for making the intentions of the Society in this reſpect generally known.

Phyſical and Literary Committees.

37. AT the ſuggeſtion of one of the Members of the Society, it was reſolved, on the 7th *September* 1808; *Firſt.* That a Committee be formed to propoſe ſuch plans and carry on ſuch correſpondence as may ſeem beſt ſuited to promote the knowledge of natural hiſtory, philoſophy, medicine, improvements of the arts, and whatever is comprehended in the general term of *phyſics*; to conſiſt of ſuch Members as may voluntarily undertake to meet for that purpoſe. *Secondly.* That a Committee be formed in like manner, for literature, philology, hiſtory, antiquities, and whatever is comprehended under the general term of *literature*.

38. THE following Rules for the two Committees were alſo adopted by the Society, on the 5th *October* 1818.

1ſt. THAT the meetings of the Literary Committee be held at the houſe belonging to the *Aſiatick* Society, on the firſt and third *Wedneſdays*, and the meetings of the Phyſical Committee on the ſecond and fourth *Wedneſdays* of each month, at the hour of nine o'clock in the evening: whenever a general meeting of the *Aſiatick* Society may be held on the ſame evening, and at the ſame hour, the meeting of the Committee to be ſuſpended. 2d. That each Committee be open

to all Members of the *Aſiatick* Society, who may chuſe to attend the meetings. 3d. That if the Preſident of the Society be preſent at a meeting of either Committee, he ſhall preſide; in his abſence, one of the Vice Preſidents, and in their abſence, the eldeſt Member of the Society preſent at each meeting ſhall be conſidered as Preſident at ſuch meeting. 4th. That the Secretary to the *Aſiatick* Society be requeſted to act as Secretary to the Literary Committee, and the Aſſiſtant Secretary to the Society be requeſted to act as Secretary to the Phyſical Committee, as far as their time and avocations may admit. 5th. That a Deputy Secretary be alſo appointed for each Committee, to be elected at the next meeting of the two Committees reſpectively. 6th. That regular books of proceedings be kept by the Secretaries for each Committee, in which minutes ſhall be entered of all papers, communications, and acts done by the Committee; that ſuch books be at all times open to the inſpection of the Members of the *Aſiatick* Society; and that ſuch papers be laid before the Society, as the Committee may judge proper to be ſubmitted. 7th. That the correſpondence of each Committee, be in general carried on through its Secretary or Deputy; but that it be at the diſcretion of the Committees, to employ any one of their Members to correſpond with any individual.

39. THAT all articles preſented to the Muſeum, be delivered in the firſt inſtance to Dr. WALLICH, to enable him to make the acknowledgment directed in the ſtanding Rules of the Society.

40. THAT the regiſter of donations to the Muſeum, be exhibited at each Meeting of the Society.

41. THAT the Committee requeſt Dr. WALLICH to prepare, as ſoon as poſſible, a complete catalogue of all articles in the Muſeum, and to affix to each article proper marks of reference to the catalogue.

42. That the Committee conceive all Members returning to India, ſhould be called upon to pay their ſubſcription, as uſual, from the date of their return.

43. That the Library be open from 10 to 4 o'clock, between which hours, the native Librarian is to be in attendance every day, Sunday excepted; when the Library is not open, the rooms to be ſhut up, and one key to remain with the Librarian, and one with the Secretary.

44. That none but the Members of the Society be allowed to borrow books from the Society's Library, and that no book be lent out of Calcutta, without eſpecial permiſſion from the Committee of Papers.

45. That books be borrowed by written or perſonal application to the Secretary. In either caſe, the perſon applying is to furniſh a written receipt, ſpecifying the name of the work, and the time for which it is borrowed, at the expiration of which period he is to return the book borrowed, or renew his application for an extended loan of it.

46. That receipts for the books, be filed, and a record kept of the books lent out, to whom, and when lent out, and when returned.

47. That a liſt of the books in the Library, and a regiſter of thoſe lent out, be kept ready for inſpection.

48. That all perſons, borrowing books, be anſwerable for their ſafe return, or for replacing them, if loſt or voluntarily injured.

49. That every borrower of a book ſhould be bound to replace it, at all events; or, in caſe of loſs by accident, pay the full value of the book as recorded in the regiſter, and which he is engaged to do in the accountable receipt he gives when he takes the book from the Library.

LIST of DONORS and DONATIONS to the LIBRARY of the *Asiatic Society*, since 1815.

DONORS.	DONATIONS.
The *American* Philosophical Society,	Memoirs of the American Academy, 3 vols.
Captain Roebuck,	Khirud Ufroz; a translation in the Hindoostanee language, of the Persian Uyari Danish; revised by Captain Roebuck, 2 vols.
Ditto,	Muzhubi Ishq, or Gooli Bukawulee, a Fairy Tale, illustrating allegorically the Soofee Philosophy; translated into Hindoostanee, from the Persian, by *Moonshee* Nihal Chund: 2d edition, revised by Captain Roebuck.
The Most Noble the Marchioness of Hastings	A Persian treatise on Agriculture, with a translation into English.
Rev. J. Marshman,	Works in the Chinese language.
Dr. Taylor,	Translation of the Lilávati, by Dr. Taylor.
J. H. McCulloh,	Researches on *America*.
The Geological Society of *England*,	Transactions of the Geological Society, vol. 3d with plates, part first, vol. 1yth.
F. Ellis, Esq.	Dissertations on the Malayan and Telinga languages.
The Most Noble the President,	Sunt Sar, a Manuscript in the *Bruj Bhak'ha* dialect, by *Raja* Duyaram of *Hatras*,
Dr. Vos,	One volume, on Anatomy, Surgery and Medicine, in the Dutch language.
Dr. R. Tytler,	Javanese Sabaism, by R. Tytler M. D.

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DONORS.	*DONATIONS.*
The ROYAL SOCIETY OF COPENHAGEN.	Transaction of the Copenhagen Royal Society, 10 vols.
	A set of maps of *Denmark.*
Dr. WALLICH,	Works on the languages and wisdom of the Indians, by F. Schlegel.
Lt. R. HOME,	History of the *Rajas* of *Aracan.*
	The Hitopadésha.
	Prophecies in the *Mug'h* language.
Dr. J. R. VOS,	Heel Kundige werken Van F. Rutsch, 3 vols.
	Menschelycken Lichaems.
	Eertijts in't Latijn, 1 vol.
H. T. COLEBROOKE, ESQ.	Translation of the Lílávati, from the original Sanscrit, by H. T. Colebrooke, Esq.
The COLLEGE OF FORT WILLIAM, ON THE PART OF GOVERNMENT,	A Dictionary of the Chinese language, 1st part, vol. 1st, by the Rev. Mr. Morrison.
	Dialogues in the Chinese language.
The HON. C. F. STUART,	Bartholomeo's Systema Brahmanica.
THE ROYAL SOCIETY OF CAEN,	Souscription pour une Medaille en l'honneur De Malherbe; and a few tracts on Statistical subjects.
MONS. CUVIER,	A Variety of his Works.
MONS. DIARD,	Memoire pour servir a l'Histoire; et l'Anatomi des Moturquere.
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MONS. HUMBOLDT,	Memoire sur l'Elevation des Montagnes de *l'Indes.*
A. SETON, Esq.	The Rámáyan'a, and the Jaya Alancára, or Annals of Victory; two Javanese Manuscripts.
Rev. J. Marshman,	Pentateuch in Chinese, printed with moveable metal types at *Serampore.*
BARON DE SACY,	Calila et Dimna, in Arabic.
Major FARQUHAR,	Drawings of several animals of *Malacca.*
E. S. MONTAGU, Esq.	Three Javanese Manuscripts.
	The Ulugh Beighi Tabulæ Stellarum.
MONS. DU VAUSEL,	Voyage Dans *l'Amerique.*
MONS. HUMBOLDT.	Vues des Cordillères, et Monumens des Peuples Indigenes de *L'Amerique.*
THE COLLEGE COUNCIL OF FORT WILLIAM, ON THE PART OF GOVERNMENT,	A Comparative Chronology of the Chinese Empire.
H. T. Colebrooke, Esq.	Some Tracts which have been published by learned foreigners.
Monf. Van Hammer,	Three numbers of the Mines of the East, and a Series of *Leipsic* Literary Journals.
THE COLLEGE COUNCIL OF FORT WILLIAM, ON THE PART OF GOVERNMENT,	Morrison's Chinese and English Dictionary.
J. SIDDONS, Esq.	A copy of the Malay Code of Law.

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Baron De Sacy,	Myſteres du Paganiſm, by Monſ. De Sainte Croiſe, 2 volumes.
	Mr. Auvaroff, on the Myſteries of Eleuſis.
	Some Pamphlets publiſhed at *Paris* on ſubjects of Oriental Literature.
Captain Roebuck,	Boorhani Qatiu, a Perſian Dictionary, Edited by Capt. T. Roebuck.
The Society for the Encouragement of Arts, &c.	Tranſactions of the Society for the Encouragement of Arts, &c. 29th to 35th vol.
Dr. McCulloh,	Reſearches on *America*.
Mr. Vaughan, Librarian of the *American Philadelphia* Society.	Tranſaction of the American Philoſophical Society, new ſeries, 1ſt volume.
Mr. Vaughan,	Journal of the Academy of Natural Science of America, vol. 1ſt part 1ſt of 1817.
	Catalogue Plantarum Americae of 1818.
	Deſcriptio Uberior Graminum et Plantarum Calamariarum Americæ Septentrionalis Indigenarum et Cucurum: 1817.
Dr. Gilman,	The Hiſtoria Univerſali Aſiatica.
Count De Souza,	Os Luſiades de Camoens.
Major Gen. Garstin,	Tranſlation of Friſi on Bridges, &c. by Major General J. Garſtin.
Monſ. Langlés,	The 11th number of the Monuments ancienne et modernes de *l'Hindooſtan*.
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Monſ. Jullien,	The firſt number of the Revue Encyclopedique; et Eſquiſſe d'un Eſſai ſur la Philoſophie des Sciences.
Monſ. Rousseau,	Memoire ſur les Wahabis; et Notice Hiſtorique ſur le *Perſe* Ancienne et Moderne.
Monſ. Count Volney,	L'Alfabet European applique aux Langues Aſiatique; and ſome other Works dedicated to the Aſiatic Society.
H. T. Colebrooke, Esq.	Treatiſe on Obligations and Contracts, by H. T. Colebrooke, Eſq.
H. H. Wilson, Esq.	Sanſcrit and Engliſh Dictionary, by H. H. Wilſon, Eſq.
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	Specimens of Hindoo sculpture.
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	Spears from the Iſland of *Engano*.
Lt. T. WILLIAMS,	Several Images from *Java*.
H. H. WILSON, Esq.	Model of an *Otaheitan* Canoe.
Mr. G. WILSON,	Two ſpears from the Iſland of *Engano*.
Capt. W. S. WEBB,	Cranium and Horns of the Argali.
	A ſingle horn of the Deer kind, from *Tartary*.
	Several articles uſed by the *Tartars*.
	Fragment bearing an inſcription, taken from a temple near *Srinagar*.
Col. YULE,	A Scythian Lamb.

P. 3. L. 7. read $\frac{1}{101.50}$ or $\frac{1}{104}$ nearly.

L. 15. & 16. for ſquare of the latitude, read ſquare of the ſine of the latitude.

L. 22. for 366, read 3,66, fathoms.

P. 4. L. 3. & 4. for 23 and 559, read 2,3 and 5,59.

L. 21. for $\frac{1}{10}$ read $\frac{1}{100}$

P. 5. L. 20. for $\frac{1}{100}$ read $\frac{1}{104}$

P. 6. L. 20. for *Punnal*, read *Punnae*.

P. 17. L. 25. for ,00,384 read ,00384.

P. 48. mean angle at *Daumergidda* between *Doodallah* and *Sheelapilly*, for $59^\circ\ 20'\ 44''.95$, read $59^\circ\ 20'\ 44''.91$. At *Doodallah*, between *Daumergidda* and *Sheelapilly*, the mean angle is $70^\circ\ 25'\ 46''.50$.

P. 94. for μ Bootis, read ϵ Bootis.

P. 97. for ϵ Bootis, read ϵ Bootis.

P. 110. L. 5 read $\overset{(3)}{X} = \overset{(1)}{X} + o + m \,.\, \text{Sin.}\ 2\,(L + \overset{\circ}{0}) + m \,.\, \text{Sin.}\ 2\,(L + \overset{\circ}{1})$

L. 6 read $\overset{(4)}{X} = \overset{(1)}{X} + o + m \,.\, \text{Sin.}\ 2\,(L + \overset{\circ}{0}) + m \,.\, \text{Sin.}\ 2\,(L + \overset{\circ}{1}) + m \,.\, 2 \,.\, 2\,(L + \overset{\circ}{2})$

P. 113. L. 4. for $A + F\ H$, read $A.\ F\ H$

L. 4. & 5. for $a^2\ b^2\ (a^2 - a^2\ \text{Sin.}^2\ A + b^2\ \text{Sin.}\ A)^{-\frac{1}{2}}$

read $a^2\ b^2\ (a^2 - a^2\ \text{Sin.}^2\ A + b^2\ \text{Sin.}^2\ A)^{-\frac{1}{2}}$

L. 7. for $a^2\ (a - a\,c).\ (a^2 - 2\,a\,c.\ \text{Sin.}^2\ A)^{-\frac{1}{2}}$

read $a^2\ (a - 2).\ (a^2 - 2\,a\,c\ \text{Sin}^2.\ A)^{-\frac{1}{2}}$

L. 8. for $(a^2 - 2\,a\,c.\ \text{Sin.}^2\ A)^{-\frac{1}{2}}$ read $(a^2 - 2\,a\,c.\ \text{Sin}^2\ A)^{-\frac{1}{2}}$

L. 13. for $(a - \frac{c}{2}).\ A - \frac{3}{4}\,c.\ \text{Sin.}\ 2\,A$

read $(a - \frac{c}{2}).\ A + \frac{3}{4}\,c.\ \text{Sin.}\ 2\,A$

REMARKS. In page 100, where the French degree due to latitude $47^\circ\ 24'$ is 60795 fathoms; it was taken from vol. 2d of Col. MUDGE's Survey; but there must have been some mistake, since in referring to the *Base du Systême Métrique*, vol. 3d p. 89, the distance between *Dunkirk* and *Montjouy* is 551683,6 *toises*, equal 587657,17 fathoms, at the temperature of 32°, which reduced to 62°, will be 587475,4 fathoms; whereas, the distance between *Dunkirk* and *Barcelona*, (which is somewhat less than the distance between *Dunkirk* and *Montjouy*), is 587987 fathoms, as given in vol. 2d p. 112 (arc on the meridian) in Col. MUDGE's Survey.

THE mean degree, by the French measurement, due to latitude $46^\circ\ 11'\ 58''$ (the middle point between *Dunkirk* and *Montjouy*), is 60728 fathoms, which appears too small. I have therefore, for the present, taken the mean degree as deduced from the arc between the Pantheon at *Paris*, and *Evaux*, which for latitude $47^\circ\ 30'\ 46''$, is 60779 fathoms, reduced to the temperature of 62°; and, by substituting these in the formula, in p. 100, we shall have by the three comparisons with the French measure, $\frac{1}{320}=\frac{1}{1,001435}$ nearly: and the mean of all the comparisons with the French, English and Swedish, will give $\frac{1}{315}$ nearly, for the compression at the pole.

In p. 114, the quantity 587987 fathoms is put for *L*, the length of the terrestrial arc between *Dunkirk* and *Barcelona*, whose difference of latitude is $9^\circ\ 40'\ 12'',2=,168774$, the length of the said arc to rad: unity. These data give $\frac{1}{315}$ for the compression. If 587475,4 fathoms be put for *L*, as the terrestrial arc between *Dunkirk* and *Montjouy*, whose difference of latitude is $9^\circ\ 40'\ 24'',24=1688327$, then the result will give $\frac{1}{315}$ nearly, for the compression; which differs

little from what would be brought out, by using 60728 fathoms for latitude $46^\circ\ 11'\ 58''$, with the three mean degree for latitudes $9^\circ\ 34'\ 44''$, $12^\circ\ 2'\ 55''$, & $16^\circ\ 34'\ 44''$.

The French mathematicians first made use of Bouguer's arc measured at the equator, with that between *Dunkirk* and *Montjouy*, which brought out a compression of $\frac{1}{100}$. But Delambre afterwards recomputed all the observations both of Bouguer and La Condamine, and ultimately brought out a compression of $\frac{1}{100}$ nearly, which was adopted.

If $\frac{1}{110}$ be used in place of $\frac{1}{304}$, in p. 108, to find $\overset{(1)}{X}$ and $\overset{(2)}{X}-\overset{(1)}{X}$ or d, we shall have $\dfrac{X - n\overset{(1)}{X}}{3\,b\,\overset{(1)}{X}} = \dfrac{d}{304}$, from which will be found $\overset{(1)}{X} = 60475{,}47$ fathoms, and $d = 3{,}5192$ fathoms, and $q = 585{,}17$ fathoms; from which data Table 2 was recomputed, and will stand as follows:

	Degrees.	Latitudes.
$\overset{(1)}{X} = \overset{(1)}{X} + o$	60475.47	$9^\circ\ 34'\ 44''$
$\overset{(2)}{X} = \overset{(1)}{X} + d$	60478.99	10 34 44
$\overset{(3)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(3)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60482.84	11 34 44
$\overset{(4)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(4)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60487.02	12 34 44
$\overset{(5)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(5)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60491.53	13 34 44
$\overset{(6)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(6)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60496.34	14 34 44
$\overset{(7)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(7)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60501.47	15 34 44
$\overset{(8)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(8)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60506.91	16 34 44
$\overset{(9)}{X} = \overset{(1)}{X} + Q\,(\text{Sin.}^2\,\overset{(9)}{l} - \text{Sin.}^2\,\overset{(1)}{l})$	60512.64	17 34 44
	544433.21 = A.	

From this Table, it appears, that the firſt degree by meaſurement is 2,6 fathoms in defect; and that the one in latitude 45° 34′ 44″ (which may be compared with X) is 5,89 fathoms in exceſs; and that the degree in latitude 13° 34′ 44″ is nearly the ſame in each; the mean being 60491,46 fathoms, which being put for m, and 13° 34′ 44″ for l, and then ſubſtituted in the formula, we ſhall get 60459,2 fathoms for the degree on the meridian, whoſe middle point is on the equator; and the degree on the equatorial circle will be 60848 fathoms. Hence, $60848 + 57°$ &c. the arc equal radius, we ſhall get $\frac{1}{2}a = 3486334$, and $a = 6972668$ fathoms, alſo $b = 6950176$ fathoms; whence, the quadrantal arc of the elliptic meridian will be found equal 5467494 fathoms; and, finally, the French *metre* 39,366 inches at the temperature of 62°, which falls ſhort of that given by the French meaſurements, 0,605 inches.

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